PROCEEDINGS

OF THE

ROYAL SOCIETY OF EDINBURGH.

VOL. IX. 1875–76. No. 93.

NINETY-THIRD SESSION.

Monday, 22d November 1875.

SIR ROBERT CHRISTISON, BART., Hon. Vice-President, in the Chair.

The following Council were elected :—

President.

SIR WILLIAM THOMSON, KNT., LL.D.

Honorary Vice-Presidents.

HIS GRACE THE DUKE OF ARGYLL.
SIR ROBERT CHRISTISON, BART., M.D.

Vice-Presidents.

DAVID MILNE HOME, LL.D.	DAVID STEVENSON, Esq., C.E.
Professor KELLAND.	The Hon. Lord NEAVES.
Rev. W. LINDSAY ALEXANDER, D.D.	The Right Rev. Bishop COTTERILL.

General Secretary—Dr JOHN HUTTON BALFOUR.

Secretaries to Ordinary Meetings.

Professor TAIT.
Professor TURNER.

Treasurer—DAVID SMITH, Esq.

Curator of Library and Museum—Dr MACLAGAN.

Councillors.

Dr ARTHUR MITCHELL.	ALEXANDER BUCHAN, A.M.
GEORGE FORBES, Esq.	ROBERT WYLD, Esq.
Principal Sir ALEX. GRANT, Bart.	Dr RAMSAY H. TRAQUAIR.
Professor GEIKIE.	Dr THOMAS HARVEY.
Dr ANDREW FLEMING, H.M.I.S.	Dr JOHN G. M'KENDRICK.
Dr CHARLES MOREHEAD.	Dr J. MATTHEWS DUNCAN.

Monday, 6th December 1875.

DAVID MILNE HOME, Esq., of Wedderburn, LL.D., Senior Vice-President, in the Chair.

The Chairman delivered the following opening Address:—

Gentlemen, Fellows of the Royal Society of Edinburgh,—In compliance with a request of the Council, I have the honour to come before you this evening to give an address, on this the first night of our Winter Session, in pursuance of the custom prevalent in this and most other Societies.

I need not say how much I regret, for your sakes as well as my own, that this duty is not to be discharged by our eminent President.

The *first* point which I will submit to your notice, is the nature and amount of the work we as a Society are doing, and our means of doing it.

The *second* and concluding part of my Address will have reference to the present aspect and prospects of science generally in the country.

With regard to the work we are carrying on, it may be sufficient to refer to the proceedings of our last winter's session. Our Secretary tells me that it was the longest session he remembers—it having been prolonged beyond mid-summer.

You are aware that our Society was intended by its founders to embrace *literature* as well as *science;* and that in regard to science, we encourage investigations in any of nature's various fields. The following abstract, under different heads, of the papers read during last session, indicates the range and variety of the Society's operations:—

In Applied Mathematics or Physics, we had 11 papers read; in Pure Mathematics, 9; Notes from Professor Tait's Physical Laboratory were read at five meetings; of Geological papers, 4 were read; of Chemical papers, 3; of Physiological papers, 3; of Anatomical papers, 3; of Meteorological papers, 2; of Literary papers, 2; separate Biographical Memoirs of eleven deceased Members were

read. Many interesting experiments were shown at our meetings; and in particular, our President, at one of our meetings, exhibited and explained his wonderful tide-calculating machine, by means of which there can be obtained in a few seconds, results which hitherto have required minute and laborious calculations.

The three Prizes which the Society has at its disposal, were awarded as follows:—

The *Keith* Prize was awarded to Professor Tait, for his paper on a "First Approximation to a Thermo-Electric Diagram."

The *Makdougall Brisbane* Prize was awarded to Professor Lister, for his paper "On the Germ Theory of Putrefaction and Fermentation."

The *Neill* Prize was awarded to Mr Charles William Peach, for his "Contributions to Scotch Geology and Zoology."

Gentlemen, an important part of our work as a Society is to publish in a volume of Transactions the most deserving of the papers read at our meetings. A copy of these Transactions is, as you know, obtained *gratis* by every member. Copies also, to the extent of considerably above a hundred, go to foreign libraries, foreign universities, and foreign societies. Many of these papers are necessarily not of so popular a character as to pay, by the sale of them, the cost of printing. But these papers, though not interesting to the general community, may be of the highest importance for the advancement of science. Fortunately our Society is sufficiently wealthy to be able to defray the expense, not only of printing, but of a large gratuitous circulation. I believe that it is a knowledge of this fact which obtains for our Society so large a membership, and so satisfactory a revenue.

With regard to our membership, we have now 358 Ordinary Fellows. I observe from the address which I had the honour of giving five years ago, that the number then was 326, so that there has been in the interval an increase of 32 members.

The number of members whom we have lost by death is, I am sorry to say, larger than usual, being altogether 14. The following are the names alphabetically arranged:—

1. *Foreign Honorary Fellow.*—Le Comte de Remusat.

2. *British Honorary Fellows.*—Sir Charles Lyell, Bart. of Kinnordy; Sir William Edmund Logan, LL.D.; Sir Charles Wheatstone, D.C.L.

3. *Ordinary Fellows.*—Rev. Dr D. Aitken; John Auld, Esq.; Professor Hughes Bennett, Edinburgh University; Rev. Professor Crawford, Edinburgh University; Colonel Seton Guthrie, Thurso; Sir William Jardine of Applegarth, Bart.; Professor William Macdonald, St Andrews' University; the Hon. Lord Mackenzie; Edward Meldrum, Esq., Dechmont; the Venerable Archdeacon Sinclair.

I propose to give an obituary notice of several in this list, with regard to whom I have succeeded in obtaining information, chiefly through the good offices of our Secretary, Professor Balfour.

Charles, Comte de Remusat, a distinguished French politician, philosopher, and man of letters, was born at Paris on the 14th of March 1797. His father held various public offices under the first Empire. His mother was an intimate friend of the Empress Josephine. The young Remusat, after a brilliant course at the Lycée Napoleon, betook himself at first to the study of law, but he soon turned to literature, and wrote as a journalist in newspapers and reviews from 1818 till 1830. In company with Guizot, Cousin, and Jouffroy, he was on the staff of the "Globe," a periodical founded by Dubois in 1824, which struggled against the growing absolutism of the Restoration. He continued afterwards, in concert with Guizot, to support *doctrinaire* constitutionalism, and in philosophy he was on the whole of the school of Cousin. His name appears in the list of journalists who protested against the ordinances which brought about the Revolution of July. In 1830, he was chosen deputy by Toulouse, and soon followed the leadership of Thiers in the Chamber. In 1838, he was for a short time Under-Secretary of State in the ministry of Count Mole, and in 1840 he was Minister of the Interior, under Thiers. After the Revolution of 1848, he continued a member of the Constituent Assembly, and supported the party of order. During the whole period of the second Empire, he withdrew

from political life, and devoted himself to literary and philosophical labours, sceptical of the possibility of an Imperial government restoring liberal institutions. The Revolution of 1870 brought the Count de Remusat back to public life, as Minister of Foreign Affairs under M. Thiers, with whom he fell in May 1873, and with whom he agreed in regarding the Republic as, if not the political ideal, at least the best practical solution of the difficulties of France. He died at Paris on the 6th of June 1875.

The Count de Remusat was a copious, solid, and eloquent writer. Besides his large contributions to the periodical press, especially the "Revue des Deux Mondes," he was the author of many valuable works. One of his earliest essays was connected with his legal studies, and appeared in 1820 ("Sur la procedure en Matière Criminelle"), followed by other tracts on the responsibility of ministers of State, the liberty of the press, and the law of elections. His most brilliant and productive period as a writer was after 1840. Among his other works are the following:—

1.	Essai sur la nature de Pouvoir, . . .	1840.
2.	Essais de Philosophie, ...	1842.
3.	Abelard, ...	1845.
4.	Melanges Philosophiques, ...	1847.
5.	St Anselm, ...	1852.
6.	Bacon—Sa Vie, son Temps, . . .	1858.
7.	La Philosophie Religieuse, ...	1864.
8.	David Hartley, ...	1874.
9.	Philosophie Anglaise—Bacon jusqu'a Locke, .	1875.

As may be inferred from the subjects of his studies, M. de Remusat was deeply interested in England. Probably no eminent Frenchman of his time understood English institutions and national character so well. The practical philosophers and statesmen of this country, and their readiness to accept the teaching of experience and to recognise the tendencies of the age, in a spirit of wise compromise, were all in harmony with his temper; which always inclined to moderation, and was averse to fanaticism, whether political or speculative, religious or anti-religious. In philosophy, he belonged to the school opposed to Materialism.

In M. de Remusat we have lost one of the most eminent of the

French politicians and thoughtful men of letters of the nineteenth century, and the philosophy of mind has lost one of its ablest expositors, though he may not have ranked among its discoverers and leaders.

CHARLES LYELL was born at Kinnordy, in Forfarshire, on 14th November 1797, and died in London 22d February 1875. He was on our list of British Honorary Fellows. His early education was obtained at Midhurst, in Sussex. He went thereafter to Oxford, and there obtained his A.M. degree in 1821. Whilst at Oxford he had the advantage of attending Dr Buckland's lectures, then Professor of Geology. On leaving the university, he studied for the English bar; but finding this line of life not likely to be congenial, and having the means of living without the aid of a profession, he betook himself to geology. The seed sown by Dr Buckland had been dropped into soil fitted to its germination and rapid development.

Probably Lyell's first paper was an account of a "Recent Formation of Freshwater Limestone in Forfarshire," his native county. This was very soon followed by many other papers, written at places visited by him in Hampshire and Dorsetshire. These were read before the Geological Society of London, of which he had become member. In the year 1824 he had shown such knowledge of geology, that he was elected one of the Honorary Secretaries of the Society.

In 1827 he contributed to the "Quarterly" a review of Mr Poulett Scrope's "Geology of Central France."

Shortly afterwards, he published his "Principles of Geology," the work in which he first showed his distrust of old geological maxims, and started his own original conceptions. Most geologists before his day had attempted to explain many things by assuming that the natural agencies of bygone times had been much more powerful than now. On the other hand, Lyell maintained that the natural agencies now on our planet were capable of producing all the effects observed, if only sufficient time was allowed for their operation.

These new views attracted great attention. The demand for the book in which they were explained was so great, that it went

through five editions in a very short time—each edition containing a large amount of new matter. The work, by these numerous additions, became so changed in character, that he reconstructed it, and brought out a new work called "Elements of Geology," and greatly altered his "Principles" as regards arrangements. In the latter, he presented explanations of the various forces at work in the earth and in the universe likely to affect the earth. In the former, he described the observed effects. Subsequently he brought out the "Student's Manual of Geology," in which he brought together most of the facts mentioned in the two previous works.

No geologist before Lyell's time had devoted himself so exclusively and so laboriously to the science. He not only kept himself acquainted with the discoveries made by others, but he travelled over large portions of the earth's surface, with the view of verifying alleged facts, and making di coveries himself.

He went to Norway, Sweden, Belgium, Switzerland, Germany, Spain, Catalonia, and the Danish islands of Seeland and Monen. He was twice in America. On the first occasion, in 1841, he went, in compliance with an invitation, to deliver a course of lectures at Boston. He then remained in the New World a whole year, his explorations extending from Canada through the States to the mouths of the Mississippi. On returning to England, he published his "Travels in North America," in which, whilst geological information chiefly is given, some useful views occur on other subjects also. In 1845 he paid a second visit to America, and examined more particularly the Southern States and the coasts bordering the Gulf of Mexico. On his return to England, he published his "Second Visit to the United States,"—a companion to his former work.

The most recent of Lyell's important works was his "Antiquity of Man," which went through four editions, the first having come out in 1863, the last in 1873. But beside these elaborate works, he published numerous memoirs, most of which had been read at meetings of the Geological Society and British Association for the Advancement of Science.

In 1836, and also in 1850, he was President of the London Geological Society. The Royal Society's Copley Medal was awarded

to him in 1858, and the Geological Society's Wollaston Medal was awarded to him in 1866.

In the year 1864 he presided at the Bath Meeting of the British Association for the Advancement of Science. He was Patron of the Scotch Geological Society. In the year 1848 he was knighted, and in the year 1864 he received a baronetcy in recognition of his services to science.

Sir Charles Lyell was married in 1832 to Mary Elizabeth, eldest daughter of the late Leonard Horner, himself a distinguished geologist. Lady Lyell was a devoted wife, and sympathised with her husband in his pursuits, accompanying him in all his travels, and assisting him in literary work.

During the last five or six years, Sir Charles Lyell lost his eyesight to such an extent that he could neither read nor recognise his friends. The last time that I was in his house, Harley Street, London, Lady Lyell had to lead him, and make known to him the presence of several friends who came in.

Lady Lyell's death in the year 1874 was a severe shock to her husband. After that event, Sir Charles's health rapidly failed. His death was caused by a severe fall on the staircase of his house, he having, owing to his blindness, missed the uppermost step.

Probably few men were ever so devoted to any special object, as Sir Charles Lyell was to geology, through his whole life. He was inspired by a genuine love of truth, and for its sake did not hesitate to retract opinions when he found he was mistaken. In the three first editions of his "Antiquity of Man" he had expressed his concurrence in the opinion of some Scotch geologists, that the land near the Firth of Forth had risen 25 feet since the Roman occupation. In the last edition of the work, he revoked that concurrence. In the account given by him of the Glen Roy terraces, he published his belief, that they were due to fresh water lakes. In a letter which I received from him shortly before his death, adverting to some facts recently discovered, he allows, that perhaps after all, Darwin's theory of the terrace having been made by the sea, might prove to be correct. Sir Charles Lyell in this respect showed an example to all men of science, in caring more for the interests of truth, than for mere consistency.

WILLIAM EDMOND LOGAN, another Honorary Fellow of the Society, was born at Montreal, Canada, in the year 1798, and died on 22d June 1875.

His father was originally a landed proprietor in Stirlingshire, and emigrated to Canada. He sent his son from Canada, when very young, to Scotland, to be educated in the High School, and afterwards in the University of Edinburgh.

When young Logan was in Edinburgh, geological investigations and speculations were exciting much interest, in consequence of the discussion between the Huttonians and Wernerians. Mr Logan then acquired a taste for geology; and having occasion to go to South Wales, he began to study the rocks in the coal-fields there, at this time, beginning to be more extensively worked. Having procured an Ordnance Survey map on a large scale, he was at the trouble to trace out and lay down upon it the outcrop of all the coal seams worked through extensive tracts of country. Seeing where the outcrops ceased to be continuous, he ascertained the amount and direction of the dykes and slips by which the strata had been dislocated. He descended into the mines, and studied for himself the structure of the coal, and examined particularly the fossils found in the coal. He was then struck by the fact, that every coal seam lay upon a bed of blue-coloured clay, in which apparently the plants had grown, now found petrified in coal. In several instances he discovered that some of the fossil trees which had their trunks in the coal-bed had their roots still stretching into the underlying bed of clay.

About this time Sir Henry de la Beche, who was directing the Geological Survey of England and Wales, happened to come into South Wales. Having heard of Mr Logan, he became acquainted with him; and having seen the work he had been carrying on, he at once put him on the staff of the survey.

Mr Logan having permanently adopted geology as a profession, became a Member of the Geological Society of London. Frequently joining in the discussions there, he made the acquaintance of Sir Charles Lyell, Sir Roderick Murchison, and other leading geologists.

Having obtained leave of absence to visit his father in Canada, he went there in 1841, and spent much of his time in exploring the great coal-fields of Nova Scotia and Pennsylvania.

In the spring of 1842 he returned to England, and in the Geological Society gave an interesting account of his survey in these American coal-fields. He had been particularly anxious to obtain a confirmation of his discovery, that coal seams everywhere rested on fire-clay; and he was able to afford these proofs from what he had seen in Nova Scotia.

He had made another discovery in these coal-fields. He had discovered the footprints of a reptile; and he brought to London with him the sandstone slab which contained these prints. This slab was submitted to Professor Owen, who expressed a clear opinion, that the impressions had been made by an animal which had four claws on the two fore feet, and three claws on the hind feet. The interest attaching to this discovery was, that no reptile had been discovered in rocks so old, it being at the bottom of the Carboniferous formation;—whereas, previously, no reptiles had been found below the Permian rocks.

I mention this discovery of Logan's, because I see that my friend Principal Dawson of Montreal, in his "Book on Acadian Geology," mentions that discoveries of similar reptiles, made in the year 1844 in Sweden and the United States, had been asserted to be prior to others of the same kind.

Logan's reputation as a geologist was now established. It led to his being entrusted with the charge of the Canadian Geological Survey, on the recommendation of Sir Roderick Murchison and Sir Henry de la Beche. The Canadian Legislature had wisely resolved to have the mineral riches of the country ascertained by competent surveyers. For nearly thirty years Sir William conducted the Canadian Survey, and drew most important conclusions regarding the whole series of rocks in that part of the world—conclusions universally accepted by geologists as correct.

At the Paris International Exhibition of 1855, he showed a large collection of specimens, besides magnificent maps and diagrams, which attained much attention, and received great commendation. It was on this occasion, that the British Government, in recognition of his eminence as a geologist, and of his services in Canada, bestowed on him the honour of knighthood.

Sir William did not publish anything beyond the official reports of his survey. He was not ambitious of fame, either as an author

or otherwise. He stuck closely to the work he had undertaken, and continued at it till the year 1869, when failing health led him to resign.

He, however, continued to take an interest in geological pursuits, and gave, from his private funds, a donation of L.5000, for the endowment of a chair of geology in the M'Gill College, Montreal.

Charles Wheatstone was born at Gloucester in 1802, and died in Paris 19th October 1875. He was on the list of our British Honorary Fellows.

The rudiments of education were obtained by him at a private school. Whether he afterwards went to a university, I have not discovered.

His youth and early manhood were devoted to the construction of musical instruments, and to experiments with the view of discovering more exactly the laws of sound. He paid special attention to the instruments depending on vibrating springs. The present improved Concertina is due to his invention.

His first scientific memoir was in the year 1823, when he published in the "Philosophical Annals" an account of some "New Experiments on Sound." It excited considerable attention among physicists, and was translated into several foreign periodicals. In 1827, in the "Quarterly Journal of Science," he published farther "Experiments on Audition," accompanied by a description of the Kaleidophone, an instrument to illustrate both acoustical and optical phenomena.

During the next eleven years, he continued to produce papers and to invent instruments for illustrating the properties of sound.

In 1838 he seems to have entered on a different subject of investigation altogether, viz., light. He had discovered relations between waves of sound and waves of light. He communicated to the Royal Society of London, and also to the British Association, an account of some hitherto unobserved phenomena of binocular vision, illustrating them by means of the instrument which he invented, called the "*Stereoscope*." To Wheatstone is due the discovery, that the conception of solidity is due entirely to the mental union of two dissimilar perspectives.

In 1852 he invented an instrument called the "*Pseudoscope*,"

which still farther illustrated the mental action in certain optical phenomena. An article in the "Edinburgh Review" of October 1858, describes thus the effect of the Pseudoscope:—"When an observer looks with it at the interior of a cup or basin, he not unfrequently sees it at first in the real form, but by prolonging his gaze, he will perceive the conversion within a few minutes; and it is curious, that while this seems to take place quite suddenly with some individuals, as if the basin were flexible and were suddenly turned inside out, it occurs more gradually with others, the concavity slowly giving place to flatness, and the flatness gradually rising into convexity."*

Wheatstone was exceedingly interested in this discovery of the interference of mental action with optical phenomena, and invented several instruments with the view of ascertaining the principles on which it depended. The subject led him to study the subject of nervous organisation; but it is believed, that he effected no special discoveries in that field.

In 1834 the science of *Electricity* began to occupy Wheatstone's attention. He endeavoured to ascertain the velocity of the electrical current. He invented many most ingenious machines with that view. He seems to have made only an approximation to the truth, viz., that the current travelled through a mile of wire in less than the 360th part of a minute.

It now occurred to him that electricity might be employed in conveying intelligence along great distances by moving a magnet. By this time an idea of the same kind had occurred in Germany. Mr Cooke, when there, had become informed of the investigations by Schilling, and having come to London, made these known to Wheatstone. A proposal for a partnership between the two, was suggested, and was carried out. Messrs Cooke and Wheatstone

* A curious circumstance, analogous to the phenomena here described, was, without the help of any instrument, observed by me and other friends lately, in watching the revolutions of a cup anemometer on the top of Alnwick Castle. On looking at the instrument, it was seen revolving in a direction consisting with the truth; but on continuing to look at it, in about half a minute the anemometer suddenly appeared to change the direction of its rotation, and to continue so to rotate. We remained for some time looking at the instrument to repeat the experiment. The same result on every occasion followed, and to every one of the party, eight or nine in number.

soon thereafter were employed to establish electric telegraphs on most of the great English railways.

In 1837 the five-needle telegraph was invented; in 1840, the alphabet dial telegraph; in 1841, the type-printing telegraph; and the automatic telegraph between 1858 and 1867. By this last machine it was found possible to transmit words at the rate of from 100 to 160 words per minute.

In 1840 Wheatstone conceived the idea of a submarine telegraph cable, and pointed out both the difficulties and the means of obviating them.

His last work was to contrive a new recording instrument for submarine cables, formed by a globule of mercury moving to and fro in a capillary tube containing acid, or by a drop of acid in a tube containing mercury, and which was found to be 58 times more sensitive than any recorder previously employed. He had gone to Paris to exhibit this invention to his colleagues of the Academy of Science, when he was attacked by the fatal illness—bronchitis—which terminated in his death.

This brief notice of Wheatstone's discoveries in the science of sound, optics, and electricity gives but a poor idea of the immense amount of brain work which he went through in the long life accorded to him. The papers which he contributed to Societies both in Great Britain and on the Continent are very numerous. They were always characterised by great lucidity of style and by copious and telling illustrations, which made them both attractive and instructive.

Wheatstone was elected a Fellow of the London Royal Society in 1836, a Chevalier of the Legion of Honour in 1855, a Foreign Member of the French Institute in 1873. In 1868 the Government of Lord Derby conferred on him a knighthood.

In private life Sir Charles Wheatstone had the reputation of being reticent and unsociable. The fact probably was, that his mind was constantly absorbed with the problems which were constantly presented to it. He was so nervous and bashful, that though always ready and pleased to describe his discoveries to any single individual, he entirely broke down when he attempted to address an audience. Hence, his Professorship of Natural Philo-

sophy in King's College, London, was little better than a title; for he never had a class.

There was no physicist of his time so universally respected. His remains were brought from Paris for interment in the family burial place at Kensal Green. The procession was followed by a vast number of carriages, including many of the nobility; and even the shops in the streets along which the funeral cortege passed were shut, whenever it was known whose it was.

David Aitken, D.D., who had been seven years an Ordinary Fellow of this Society, was born about the beginning of this century. He died on the 27th March last, in his own house in Charlotte Square, Edinburgh. He was educated at the High School and University of Edinburgh, and became a licentiate of the Church of Scotland.

I believe that he had been tutor in the family of the Earl of Minto, by whom, or through whose influence, he was in the year 1829, presented to the parish of Minto. There he remained minister for thirty-seven years; and on resigning his charge, purchased a house in Edinburgh, where he lived till his death.

Being fond of travel, he visited Norway, Italy, Egypt, and Syria. As he suffered extremely during the winter season from delicacy of chest, he often spent the winter abroad. Possessing an independent fortune, he was able to obtain the services of an assistant during his absence.

He was a person of literary tastes, was well acquainted with the German language, and was a friend and correspondent of the German philosopher Hegel. In the year 1827 he wrote an article in the "Edinburgh Review" on German literature. He also drew up the Statistical Accounts of Minto Parish, embodying an excellent account of its geology, botany, and zoology.

His knowledge of Church history was so considerable that he was offered the Chair of Church History in the University of Edinburgh. On his declining it, the late Dr Welsh was appointed. His sermons were in composition marked by great elegance and clearness; but owing to delicacy of chest, his voice was weak, and his manner in the pulpit had not the earnestness necessary to create interest.

He was exceedingly fond of natural history, and took great

interest in his garden, which was always kept with scrupulous neatness.

JOHN HUGHES BENNETT was born in London 31st August 1812, and died at Norwich 25th Sept. 1875. He had joined our Society in 1842.

He was educated at the Grammar School, Exeter. It is stated, however, that he was indebted for the early part of his education to his mother, a lady of brilliant intellectual attainments. Being a great admirer of Shakespeare, she caused her son to read aloud to her many of his plays, and as he did so, taught him the art of emphasis and rhetorical action. Probably to this tuition of his mother, Dr Bennett was indebted for the elegance of his composition, and for the impressiveness of his delivery when he lectured or spoke in public.

He commenced the study of medicine at Maidstone, in the year 1829, under the guidance of a practitioner there. It was there that he acquired the art of dispensing, and even obtained a certain amount of medical practice. He assisted also in *post-mortem* examinations.

To acquire better medical instruction and training, he removed to Edinburgh in the year 1833,—unacquainted with any one in that city or in Scotland. By his talents and assiduity he soon attracted the notice of his professors, and obtained the esteem of numerous fellow-students. His attention was devoted chiefly to anatomy, physiology, and pathology. Having joined the Royal Medical Society, and shown his abilities and knowledge at its meetings, he ultimately became President of the Society. Whilst still a student, in the year 1836, he published two papers which obtained for him considerable credit.

In the year 1837, he received the degree of M.D. with the highest honours, obtaining at the same time a gold medal for his thesis.

After obtaining all the knowledge which Edinburgh could supply, Dr Bennett repaired to Paris, where he studied for two years. Being able to speak and write the French language fluently, he wrote in the French medical journals, and ultimately became President of the Parisian Medical Society.

He also went to Germany, spending some time in the principal University cities, and endeavouring to acquire knowledge beyond what he had already obtained. One of his acquisitions on the Continent was ability to use the microscope in practical medicine. Nor was his pen idle, for whilst abroad, he contributed no less than seventeen articles to Tweedie's "Library of Medicine."

In 1841 he returned to Edinburgh, and commenced a course of lectures on histology. He there took the opportunity of showing to what an extent the microscope might and should be used. It was at this time that Dr Bennett published a treatise on the use of cod-liver oil as a therapeutic agent in certain forms of gout, rheumatism, and scrofula,—dedicating the treatise to Sir Robert Christison. In Germany he had seen the good effects of using this medicine in these cases.

From 1842 to 1848 he continued to give lectures on various medical subjects. In the last named year he was appointed to the Chair of Institutes of Medicine, vacant by the transference of Dr Allen Thomson to Glasgow.

For several years Dr Bennett was proprietor and editor of the "Edinburgh Monthly Journal of Medical Science," in which, besides editorial articles and reviews, he inserted multitudes of separate memoirs.

In the "British Medical Journal," where a detailed account of Bennett's life and labours is given, and from which I have culled the foregoing notices, I see a list of no less than 105 memoirs on various anatomical and pathological subjects.

In July 1848 Dr Bennett was unanimously elected to the Chair of Institutes of Medicine.

Whilst teaching in the University and in the Infirmary, Professor Bennett found time for literary work, and published his highly appreciated "Clinical Lectures on the Principles and Practice of Medicine." This book passed through five editions in this country, and six in the United States, besides being translated into French, Russian, and Hindoo.

The following additional works flowed from his ready pen. Their titles were, "Pulmonary Consumption," "Cancerous and Cancroid Growths," Introduction to Clinical Medicine," "Outlines

of Physiology," "Text-Book of Physiology—General, Special, and Practical."

Professor Bennett had conferred upon him numerous honours and distinctions. He was President for two years of the Medico-Chirurgical Society of Edinburgh; Hon. Secretary and *emeritus* President of the Royal Medical Society of Edinburgh; and Fellow of numerous medical societies on the Continent. He had sent to him, about a year before his death, a special licence from the French Government entitling him to practise medicine in France. This honour was probably suggested by the fact of his having, two or three years before his death, resided in the south of France for the benefit of his health.

The enormous amount of work, both mental and physical, which Professor Bennett undertook, probably shortened his life. About 1865 his first illness appeared in the form of a throat affection. Having recovered by a sojourn in the south of France, and returned to Edinburgh, he was again prostrated in 1869. After an interval he recovered, but in the winter of 1871-2 he was obliged to return to Mentone. During the following summer, he resumed work in Edinburgh, and gave some clinical lectures. The winters of 1872–3 and of 1873–4 again forced him into a warmer climate, but each time with less benefit. In the year 1874, he resigned the Chair of the Institutes of Medicine. Last winter he spent in Nice. His last illness was owing to disease of the bladder. In August last he returned to Norwich, the place of his birth, where an operation was performed, and a stone was extracted. The debility caused by this operation, combined with previous exhaustion of constitution, brought on death.

Undoubtedly, Professor Bennett was in the medical profession a person of great eminence. He introduced many very important changes in medical practice, and made known many new principles. His devotion to study and investigation probably led to his having the character of being somewhat unsociable and austere. But those who had the privilege of intimacy with him, know that he was truthful, honest, honourable, and earnest in every relation of life.

The Rev. Dr Thomas Jackson Crawford joined our Society in

1871. He was born in 1812, and died 11th October 1875, at Genoa, at which place, when he died, he was sojourning for the benefit of his health.

His father was Professor of Moral Philosophy in the United College of St Andrews.

His son Thomas received the earlier part of his education at the Edinburgh High School. To St Andrews he went back for his more advanced studies. Intending to be a clergyman of the Scotch Church, he took his degree in 1831, and in 1834 was licensed as a preacher of the gospel by the Presbytery of St Andrews. Whilst at college he attracted the special notice of the professors by the superiority of his talents, his assiduity to learn, and the excellence of the essays which he produced. The patronage of the parish of Cults being in the gift of the Principal and Masters of the United College, he was presented to that parish.

When the Royal Commission on Church Patronage in Scotland sat, it inquired into the way in which the University of St Andrews exercised its ecclesiastical rights.

On that occasion the Rev. Dr George Cook, one of the Professors of St Andrews, explained to the Commissioners the circumstances attending Mr Crawford's presentation; adding, that though his own son was then desirous of obtaining it, and though there was a party in Cults parish wishing his appointment, he did not hesitate to prefer young Crawford to his own son.

Whilst minister of Cults, he wrote a Statistical Account of the parish, which, besides other information, contains several interesting anecdotes regarding the youthful career of Sir David Wilkie, the painter, whose father had been minister at Cults.

From Cults, Mr Crawford was translated to Glamis, and six years later he was promoted to Edinburgh, to be minister of St Andrew's Church, jointly with the late Rev. Dr Thomas Clark.

About this time he received from his *alma mater* University, the degree of D.D. He also, shortly thereafter, was made Convener of the General Assembly's Committee on Psalmody, an appointment for which he was well fitted, on account of his knowledge of and fondness for music.

Having preached a sermon in 1847 on Jewish Missions, which was afterwards published, that circumstance led to his being selected

to take the oversight of the General Assembly's Scheme for the Conversion of the Jews.

In 1853 he entered the arena of controversy by publishing first a pamphlet, entitled "Presbyterianism Defended against the Exclusive Claims of Prelacy," and thereafter another pamphlet, entitled "Presbyterianism or Prelacy; which is the more conformable to the pattern of the Apostolic Churches." His views on these subjects were reiterated by Dr Crawford in the Address which he delivered from the Chair of the General Assembly, as Moderator, in the year 1867. This public advocacy of Presbyterianism, to the prejudice of Prelacy, drew forth some letters from Bishop Wordsworth, which were published in the "Scotsman" newspaper.

"The Fatherhood of God" was Dr Crawford's first important contribution to purely doctrinal subjects. Dr Candlish, some of whose views were controverted, replied to this publication.

At this time Dr Crawford was Professor of Divinity in Edinburgh University, having succeeded the Rev. Principal Lee in the year 1859.

He published also a volume on the "Atonement," in the year 1871.

In the year 1874 he was appointed the Baird Lecturer. His lectures, first delivered in Glasgow, were afterwards, by special request, re-delivered in Edinburgh, and were published in a volume under the title of "Mysteries of Christianity."

The immense amount of study which these lectures entailed, I have heard, weakened Dr Crawford's health, and prepared his constitution for the illness to which he ultimately succumbed.

In the winter following the publication of these lectures, he was obliged to reside in the milder climate of the south of England. He suffered from great delicacy of lungs. But he returned to Edinburgh last spring, whilst the sharp east winds were still prevailing, and moreover betook himself again to College work, against the advice of his medical friends.

During the summer of 1875 he went to Germany, sojourned a while in Switzerland, and then went to Italy. There he so far recovered his strength, that he could walk considerable distances, and even up steep hills, without suffering inconvenience. But the weather in the north of Italy is often dangerous to persons with

weak lungs, especially when the wind is from the north. After a short illness of ten days, caused by inflammation of the lungs, he died.

Dr Crawford, besides being a man of great eminence, and most highly respected in his own profession, was a person of varied attainments. Besides having a knowledge of music, he often took his part at amateur vocal concerts, with others—some of whom are probably now present among us to-night—and who, I am sure will bear me out when I say, and I say it from a long personal acquaintance with him, that Dr Crawford was a person of most amiable disposition, and most conciliatory in all the relations of life. Though he entered into controversy he ever avoided personal aspersions; and those with whom he fought, were always ready to admit the fairness with which he wielded his weapons.

I learn from Dr Crawford's son, what I had not been aware of, that Dr Crawford kept up to the last, his knowledge of mathematics; and that frequently, when he was in want of recreation, nothing pleased him more than taking a problem and working it out.

Sir William Jardine, Bart. of Applegarth, in the county of Dumfries was born in February 1800, and died 21st November 1874. He had been fifty years a member of this Society.

He was the son of the sixth baronet, by a daughter of Thomas Maule, the representative of the Earls of Panmure.

Born in Edinburgh, he was educated partly at home, partly at York. With a view to the medical profession, he attended the medical classes in Edinburgh. But he did not carry out these professional views. Having succeeded his father when he was scarcely twenty-one years of age, he took up his residence at his family dwelling-place, Jardine Hall. By this time he had evinced a strong taste for scientific pursuits, especially natural history in all its branches.

He was a good botanist, a good geologist, and a good ornithologist. He was also a keen sportsman, both with the gun and the rod. Very many specimens in the large and valuable museum which he formed at Jardine Hall, were collected by himself.

In the year 1825 he commenced, in conjunction with the late Mr Selby of Twizell, in Northumberland, the publication of the

"Illustrations of Ornithology." In 1833 he undertook a still more important work, "The Naturalists' Library," forty volumes of which appeared in the course of the next ten years—a work for which he obtained contributions from the best scientific naturalists in the kingdom;—but of this work, no less than fourteen volumes are made up of contributions by Sir William exclusively. He also published a new edition of Alexander Wilson's "American Ornithology;" started and carried on for some time a magazine of zoology and botany; and was also for some years a joint editor of the "Edinburgh Philosophical Journal."

Here is a list of other works which flowed from his pen:—New edition of "White's Selborne," "British Salmonidæ," "Ichthyology of Annandale."

A still more important work by Sir William Jardine was entitled "Contributions to Ornithology," in three volumes, extending from the year 1848 to 1852. This work contains descriptions and coloured figures of many species of birds previously unknown. Another publication was "Memoirs of the late Hugh Edwin Strickland," in the year 1858. Mr Strickland had married a daughter of Sir William. He was a good geologist. He unfortunately was killed in a railway tunnel, the rocks of which he was examining when a train came on him unexpectedly.

Jardine's frequent visits to Northumberland, to co-operate with his friend Mr Selby of Twizell, brought him into acquaintance with Dr Johnston of Berwick-on-Tweed, who was well versed in botany and marine zoology. Dr Johnston having about this time founded the Berwickshire Naturalists' Club, Sir William Jardine joined it in September 1832, and in that year contributed papers of some value on the "Parr" and the "Silver White," small fish of the salmon species, which frequented the Tweed and many other rivers. At that time, the true nature of these fish was not known, though it has since been well ascertained that the parr are the young of the true salmon in their first year's growth.

Sir William Jardine was President of the Berwickshire Naturalists' Club in the year 1836, and frequently attended its meetings in subsequent years.

In the year 1860 he was one of the Royal Commissioners appointed to investigate the Salmon Fisheries of England and

Wales. The evidence collected by these Commissioners is of great value. Legislation followed on their report.

Shortly before his death, Sir William occupied himself in preparing a catalogue of the various objects of interest in his museum. This catalogue was in proof, and awaiting revisal when he died. The list of birds contains no less than 6000 species, and probably not less than 12,000 specimens. Sir William was most obliging in lending specimens to friends. I remember on one occasion obtaining from him on loan the skull of a fossil bear found in this country, on the occasion of a popular lecture which I was giving in Berwickshire.

Sir William Jardine was during the last ten years of his life constantly resident at Jardine Hall, enjoying the sports of country life, discharging the duties of a proprietor, and taking his share of county and parochial business.

William Macdonald was born in the year 1798, and died on 1st January 1875. He was the oldest member of our Society, in the class of Ordinary Fellows, having joined the Society in the year 1820. There is, however, one older member, my venerable friend Sir Richard Griffiths, who is an Extraordinary Fellow of the Society. He was ninety-one years of age last September, and is still in excellent health, residing near Kelso. I believe that Sir Richard would have been here to-night, had the weather been less stormy.

Dr Macdonald at an early age inherited a good estate in Argyllshire. He applied himself to the execution of extensive works in that county, for the improvement of his property, and of the district where it was situated. Unfortunately he involved himself in financial difficulties, and was obliged to sell his estate.

He then studied medicine, passed with honours, but never practised.

In 1820 he joined a number of Societies. He was the oldest member not only of our Society, but also of the Royal College of Physicians and of the Linnean Society.

Dr Macdonald frequently read papers to us on various subjects. He held peculiar views on some points of anatomy, which were

entirely at variance with those generally held; but he never would concede that he was in error.

He was very partial to natural history, and wrote upon "The Structure of Fishes," "The Unity of Organisation, as exhibited in the Skeleton of Animals," and "On the Vertebral Homologies, as applicable to Zoology."

In the year 1849 he accepted an appointment to that somewhat anomalous professorship of "Civil and Natural History" in St Andrews, but I am not sure whether he ever had any students.

He had formed a large and interesting collection of specimens in natural history and anatomy.

Principal Shairp informs me that, a few years before his death, Dr Macdonald made over this collection to the University Museum.

Donald Mackenzie became a Fellow of this Society in 1870. He was born 19th June 1818, and died 17th May 1875, at Norwood, near London, where he had gone on account of ill health.

Though born in Edinburgh, his father was from Sutherlandshire, and a Captain in the Royal North British Fusiliers. His mother was Robina Jamieson, one of the seventeen children of John Jamieson, D.D., who wrote the well-known Dictionary of the Scottish language.

Donald was the eldest of seven children, all of whom he survived, though he, too, died at the comparatively early age of fifty-seven.

At first he studied for medicine, and received the degree of M.D. from the University of Edinburgh in 1838. He was also a Fellow of the Royal College of Surgeons.

But he abandoned that profession, and came to the Scottish bar, influenced, it is believed, by the expectation that as his uncle, Robert Jamieson, advocate, had a large amount of practice in the Courts, he would be able to give him a lift. Robert Jamieson I remember well in the Parliament House, being the most conspicuous figure there for height and breadth, and a lawyer of great acuteness. His sister, Donald's mother, lived to the age of eighty-four.

Donald, to whom this notice refers, did not inherit the Jamieson constitution. He was narrow-chested and slim, but walked with elastic step.

Having come to the bar in 1842, he soon got into considerable practice, and was popular among his brethren in the Parliament House. He was appointed Advocate-Depute in 1854, an office which he held till 1858, when he lost it on a change of Government. He was reinstated in 1858, and was appointed Sheriff of Fife in 1861. In the discharge of this office, he is said to have given great satisfaction, both to the practitioners in the Sheriff-Court and to the resident gentry.

Mr Mackenzie was raised to the Bench in 1870, and was not only most conscientious in his attention to the judicial duties, but was successful in pronouncing judgments which were seldom reversed. It is related that on two occasions, when they were reversed in the Inner House, they were, by an appeal to the House of Lords, adhered to.

Lord Mackenzie was exceedingly fond of all country sports. A serious illness was contracted, about two years before his death, in consequence of his continuing to fish in wet clothes, till he got a severe chill. In November 1874 he became so ill, that he was obliged to ask leave of absence for the winter. During the subsequent Christmas holidays, he attempted to return to his work in the Bill Chamber, but he was obliged to give it up, and confine himself to bed. Disease of the heart, aggravated by rheumatism, had set in. He continued more or less an invalid for a whole year before his death, seldom discharging any judicial work.

Lord Mackenzie was universally respected for his close attention to duty, his sound knowledge and judgment as a lawyer, his freedom from guile, and his conciliatory disposition toward all with whom he was brought in contact. His life was shortened by a determination to perform any duty incumbent on him, though probably conscious that he was thereby weakening his constitution.

JOHN SINCLAIR was born 20th August 1797, and died 22d May 1875. He was the third son of the Right Hon. Sir John Sinclair, Bart. of Ulbster, in the county of Caithness, author of that valuable repertory, the Statistical Account of Scotland. His mother was Diana, daughter of Alexander, the first Lord Macdonald.

His education commenced in Edinburgh University; but he went afterwards to Pembroke College, Oxford.

In the last book which he published, entitled "Old Times and Distant Places," he mentions that, when at Edinburgh University, he was the chief means of forming what was called the "Rhetorical Society," among the members of which were the present Earl of Wemyss, the late Adam Anderson (afterwards Lord Anderson), and David Robertson, who, whilst on his death-bed, was created Lord Marjoribanks.

When he went to Oxford, he proposed a similar society; but "the Dons" (he says) "frowned upon him, and prevented it." The project was renewed some years after. The "Oxford Union Club" was then formed, embracing among its members the present Archbishop of Canterbury, Mr Gladstone, Mr Lowe, and others who afterwards became men of distinction.

Having gone through the necessary forms for taking orders in the Episcopal Church, he was ordained by the Bishop of Lincoln in 1820. He was shortly thereafter appointed to St Paul's Episcopal Chapel, Carrubbers Close, where he remained till he became assistant to the Rev. Mr Alison, the officiating clergyman of the then new and handsome chapel of St Paul's, in York Place.

It was in the year 1820 that Mr Sinclair joined our Society. I see from his little book, that he took a considerable interest in our proceedings, as he mentions our Dinner Club, of which he was a member, and specifies several duties which he undertook as a member of Council.

Thus he was selected by the Council to endeavour to induce Dr Williams, rector of the English Academy, to shorten the length of a paper he was to read on Greek particles, a subject on which he had read several long papers before, much to the *ennui* of the majority of members. Dr Williams, it seems, was not a person who could be easily diverted from his purpose; Mr Sinclair undertook to try his hand upon the inflexible Welshman. He explains, in an amusing way, how he succeeded.

Another more important work with which Mr Sinclair was entrusted by our Council, was the arrangement of the unpublished MSS. of Hume, the historian. These MSS. had been left as a legacy to the Society by the late Baron Hume, the historian's

nephew. In this duty he was conjoined with the late Lord Meadowbank and Dr Abercrombie; but the chief part of the work fell on Mr Sinclair.

He mentions that it was in the year 1828 that he became acquainted with Dr Thomas Chalmers, when the latter resigned his professorship of Moral Philosophy at St Andrews, to become Professor of Divinity in Edinburgh University. Having a great admiration for the doctor's character and writings, he attended his first course of lectures, and describes the intense interest with which he and the other students listened to the professor's expositions. The salary of the professors being then very small—only £200—the idea of offering a testimonial to Dr Chalmers, at the end of his first course, occurred to Mr Sinclair. Accordingly a sum of £200 was raised from the voluntary students, and presented to the new professor.

In the year 1839 Mr Sinclair went to London, apparently to consult Mr Wardrop, the celebrated occulist, about his eyes. He had to submit to a painful operation and to severe discipline, which confined him to a room in London for some weeks.

Whilst he was there, a vacancy occurred in the office of Secretary to the National Society—a great Society, established, among other things, for the encouragement and support of schools connected with the Church of England. Mr Sinclair was asked to fill the vacant office. At first he refused, as it would oblige him to leave Edinburgh altogether, and he could not be certain of being so well received in London as he had been in his own country. But finding that the two London Archbishops and other persons of influence were anxious that he should accept, he consented. He was at the same time appointed to be examining chaplain to the Bishop of London.

Immediately after entering on this new office, he found himself involved in a great public controversy, which called for the utmost exertion, with great tact on his part. The controversy had reference to the schools of the National Society receiving aid from Government. After the administration of the Education Grant was transferred from the Lords of the Treasury to the Privy Council Committee, a system of inspection, to see that the schools were properly conducted as regards teaching, was resolved on. The

Church of England did not object to inspectors; but inasmuch as the religious instruction in the schools was to be reported on by Government inspectors, the Church desired to have some security as to the qualifications of the inspectors to judge of that instruction.

The National Society, at the suggestion of Mr Sinclair, resolved to intimate to Government that they would recommend the managers of all Church of England schools to refuse the Government grants, unless some arrangement satisfactory to the Church was made on that point. The Government having at first refused to make any concession, notice was sent to the Privy Council from the managers of about 200 schools, that they would not in future receive the grant. Mr Sinclair, in support of the National Society's views, appealed to the Universities of Oxford and Cambridge, and secured their help. He preached on the subject; he induced several of the leading London newspapers to advocate the views of the Church; he obtained the assistance of Lord Ashley and other influential public men. At length the Privy Council Committee yielded,—agreeing that no inspector should be allowed to examine any Church of England School whose name had not first been submitted to the Archbishops of Canterbury and York for their sanction. This privilege was extended also to the schools in Scotland connected with the Church.

The grants to the Church of England Schools were paid to the Treasurer of the National Society, and were by him distributed to the schools. When the above arrangement had been completed, the office of treasurer was held by a Mr Watson, who was so averse to the proceedings of the Privy Council, that to avoid touching the unclean thing, he refused to receive the Government grant, or grant a receipt for it, and sent in his resignation. Mr Sinclair on this occasion was appointed to be treasurer, so that he was installed into the two most important and laborious offices of the Society.

In the year 1843 Mr Sinclair, in addition to these duties, was called on to undertake important pastoral work. In that year he was appointed Vicar of Kensington, and in the following year Archdeacon of Middlesex.

The population of that new part of London had immensely outgrown the means of public worship, so he set himself to work on

behalf of Church Extension. He remained Vicar and Archdeacon for the last thirty years of his life. When he came into the district there were three parishes; before the close of his career, he had been the means of forming in it twenty-three parishes.

Whenever Mr Sinclair found it necessary to carry any important measure in later years, he seems to have acted on a hint given to him by the late Dr Chalmers, on the last occasion, as he says, that he saw this great and good man. This was in the year 1843. He had been telling the Doctor of what he was doing for the support and extension of the Church of England National Schools, and in particular, how he had received promises of support from hundreds of influential people, including members of the Cabinet and of both Houses of Parliament. Dr Chalmers, he says, "heard me patiently for some time, and then replied, 'Mr Sinclair, I perceive you are an enthusiast; your National Society must, under God, depend upon the *nation* for support, and not on Cabinets or Parliaments.'"

After this conversation, very little is said by Mr Sinclair in his autobiography about applications by him to influential individuals; whilst a good deal is said about the public meetings which he resorted to when he wanted to raise money, or to influence public opinion. He never spoke from the platform himself; for after leaving the University, he lost the fluency of speech, which he says, he had acquired there; but he had great tact in arranging meetings and providing speakers who were likely to be listened to.

Several amusing stories of this kind are told in his little book. One may be mentioned. Mr Thackeray had recently come to reside in Kensington, and Mr Sinclair thought his name would be a powerful attraction. Mr Sinclair called upon him. Thackeray was unwell, and in his bedroom. Mr Sinclair having sent up his card, Thackeray came down stairs, when Mr Sinclair explained his object. Thackeray at once declined, saying he had never in his life made a speech in public, and that he only wrote for the public; and besides he was too ill to leave the house. Mr Sinclair said that he would not insist on a speech, but that it was very difficult to get up a meeting in Kensington, and that if Mr Thackeray would only allow his name to be printed in the handbills, he would not insist on his saying much, and would have the speaking done by

others. Mr Thackeray was amused, and said, "Well, if I am alive, I will come to your meeting." The handbills were accordingly issued with Thackeray's name in them. A great crowd assembled. Mr Thackeray appeared on the platform. He found when there he could not avoid saying something. His words were few but telling, and they were received with enthusiasm. Mr Sinclair adds, that this was the only time that the rhetorical powers of the great novelist were proved at a public meeting.

It was not merely in London that Mr Sinclair was of use. During general periods of great distress in the manufacturing and mining districts of Wales and Lancashire, the bishops of these dioceses obtained his services to enable them to raise funds and devise measures of relief; his services in these respects being thought of, on account of his well-known business habits, and also his sympathy with the working classes.

In the year 1853 he was sent out to the United States as one of a deputation from the Church of England to the General Convention of the Protestant Episcopal Church in New York. When there, he made acquaintance with Mr Washington, the nephew of the great man who had founded the American Republic, and with whom his father, Sir John Sinclair, had corresponded.

I have had sent to me a long list of pamphlets, books, and sermons, published by the Archdeacon. The largest work is one in two volumes, published in 1837, on the Life and Times of his father.

From what I have said, it will be perceived that Mr Sinclair, by the energy with which he threw himself into every work he undertook, justified Dr Chalmers' opinion, that he was an enthusiast. But his enthusiasm was—which is rarely the case—tempered with great good sense and sound judgment. His untiring industry, his practical usefulness, and his benevolence of character, showed that he was no unworthy son of a most excellent and patriotic Scotchman.

Having concluded all that it has occurred to me to state regarding ourselves—I mean regarding the work we are doing, and our means of doing it—I proceed to submit to you a few remarks regarding the present state of science generally in our own country.

It appears to me that a great educational movement, amounting

almost to a revolution, is at present taking place in our land, and especially in that branch of public education which relates to science. I will not say that old institutions are being subverted; but undoubtedly new institutions are rising up very different from the old, and the old are undergoing considerable changes. I believe that the seed from which all these changes have sprung, and are springing, was planted by one man—the late Prince Consort. I know of no other person of weight and influence who so constantly took every opportunity of urging on the people of this country the introduction into our universities and schools of scientific instruction.

This opinion is shared by others more entitled than me to speak on this subject; to whom I will now shortly refer.

Three weeks ago, at Oxford, His Royal Highness Prince Leopold agreed to perform the duty of distributing prizes to students of the School of Science and Art established in that town. The prince was introduced on that occasion by the Duke of Marlborough, lord-lieutenant of the county, and who, some years ago, was President of the Government Department on Education. His Grace, on introducing the prince, said that "it was not surprising that His Royal Highness should take a warm interest in every thing that belonged to Science and Art, when they remembered that he trod in the steps of the illustrious prince to whom the development of Science and Art in this country was mainly if not wholly attributable."

Prince Leopold responded to this sentiment. "I do not forget," said His Royal Highness, "that there is devolved upon me, as well as upon other members of my family, a sacred trust, to foster, in such manner as we are able, the general study throughout the kingdom of Science and Art. From the passage I am about to read," he continued to say, "you will perceive that only a few years ago, and even in our university, Science and Art studies received little, if any, support. I will quote from an address by my revered father on the occasion of his laying the first stone of the Birmingham and Midland Institute, almost exactly twenty-four years ago." The passage quoted by Prince Leopold, was a remarkable one. Its first sentence was as follows:—"The study of the laws by which the Almighty governs the universe is our bounden duty." Prince

Albert, in the passage so read by his son on this occasion, went on to show that, besides being our duty as human beings, it was for our interest as citizens to attend on these studies. "I advise you," said the prince, "to follow, in undivided attention, the sciences of mechanics, physics, and chemistry, and the fine arts of painting, sculpture, and architecture. You will thus confer upon your country an inestimable boon, and in a short time have the satisfaction of witnessing the beneficial results upon our national powers of production. Other parts of the country will emulate your example, and I live in hope that all these institutions will some day find a central point of union, and thus complete the national organisation."

Weighty as these words of Prince Albert were, and coming from an authority so much respected, I am not sure that they would have been universally listened to, had it not been for the great international exhibition of works of industry held in London in the year 1851—itself a measure due to the sagacity of that excellent prince. There the people of this country first saw, with their own eyes, what were the fruits of the superior schools for scientific instruction existing in Germany, Austria, Switzerland, and France.

Shortly afterwards, royal commissions were issued to ascertain to what extent any of the sciences specified by the Prince Consort were taught in our schools.

The result of these inquiries was sufficiently remarkable.

In the year 1864 the Public Schools' Commission, after special inquiry, reported that from all the first class schools in England, the teaching of science was practically excluded.

This official exposure had some effect; for in the year 1868 another Government commission, the Endowed Schools' Commission, reported, that a majority of the endowed schools in England had intimated their willingness and their intention to introduce science teaching.

To how very small an extent this promise was fulfilled, may be judged of by the revelations of the Oxford and Cambridge school examinations made throughout England during the last three or four years. Even in this very year of 1875 what has been ascertained? Out of 461 candidates for certificates of good scholarship from 40 first-class English schools, there were only 28 scholars in

chemistry, 21 scholars in mechanics, 15 in physical geography, and 6 in botany; whilst for Greek there were 433 scholars, for Latin 438, and for elementary mathematics 458.

The small amount of scientific instruction given in the English endowed schools was ascertained, still more precisely, by the Royal Commission, which has only recently framed its report. I mean the commission over which the Duke of Devonshire presided. From that report it appears that a circular was sent out by this commission two years ago to about 250 endowed schools, requesting them to fill up a schedule showing what amount of scientific instruction, if any, was given in them.

Only 128 answers were received. That fact alone was significant. But when these answers came to be examined, it was found that out of the 128 answers, only 87 gave any definite information. Of these 87, 65 confessed to giving no science teaching whatever; of the remaining 22, the utmost time allotted to any kind of scientific instruction, was four hours per week, in eighteen of the schools.

But though it was right to ascertain the truth in this matter through the authentic inquiries of royal commissions, the people of this country, knowing well enough, from their own experience and observation how the matter stood, would not wait for these official inquiries. They took the matter into their own hands, and set to work at once to supply what was required. I do not know any stronger proofs of public patriotism in our country, than what this educational movement affords. In all the great centres of industry, arrangements were made for having institutions established in which not only science in its various branches should be taught, but the arts and literature also.

At Manchester, John Owens bequeathed about L.100,000 for the endowment of a new college. No part of that money, however, being allowed to be expended on buildings, his fellow-citizens supplied what was needed. A sum of L.250,000 was raised; and in the year 1870 the foundation stone of a magnificent edifice was laid for a Science and Art College, the Duke of Devonshire presiding.

In the year 1871, a physical science college was established in Newcastle, for which L.35,000 was raised; and as it was to be affiliated with Durham University, that university agreed to give L.1000 a year out of its revenue for the institution.

In the year 1873, Josiah Mason, who had made a large fortune as a manufacturer at Birmingham and Kidderminster, gave the princely sum of L.250,000 for the erection and endowment of a College of Practical Science in Birmingham.

In January 1874, an association was formed for the promotion of scientific industry in Lancaster, at which the Earl of Derby presided—an association formed chiefly at the instance of Lancaster manufacturers and artizans, who, having visited the Vienna International Exhibition held in the autumn of 1873, had seen there the rapid and alarming progress of Continental nations in many of the arts.

In the same year, the Yorkshire College of Science was begun in Leeds, of which college Lord Frederick Cavendish is president, there being L.100,000 subscribed for it.

In the course of last summer, steps were taken to establish in Bristol a College of Science, to be affiliated to Oxford University, for which L.26,000 has been already subscribed. Nottingham, Sheffield, and other towns, not so wealthy as to found colleges, are, however, stirring for the establishment of schools and societies for the teaching of classes.

In Scotland, Dundee is stirring, wishing to have a college which is to be affiliated with St Andrews University, and for which it is proposed to raise as much as L.200,000.

Nor are our old, time-honoured national universities, in the midst of this great educational movement, asleep. Asleep or indifferent they could scarcely remain, for very obvious reasons. Both at Cambridge and at Oxford, science lectures and fellowships have been at length introduced; and the Chancellor of Cambridge, the noble Duke of Devonshire, has, from his own funds, presented that university with a splendid chemical and physical laboratory, having a most complete apparatus, at a cost of L.10,000.

Our own University of Edinburgh has during the last five years had three new chairs created and endowed for engineering, geology, and political economy; and farther measures of extension, on a large scale, are being adopted, for which above L.85,000 have been already subscribed.

Even the *farmers*, who are not generally proverbial for moving out of old paths, or even for moving in them, except at a slow pace,

are showing signs of progress. The Royal English Agricultural Society last year set apart L.500 to be given yearly in scholarships to encourage instruction in the sciences bearing on agriculture.

The Highland and Agricultural Society has this year set apart L.250 for a similar purpose.

But I must here offer a word of apology for the managers of the English endowed schools, which, in their programmes of studies, made no provision whatever for science. I remember when my son was at one of these schools, that I went to the head master and ventured to hint the disappointment I felt at the want of such provision. His answer was—" We are obliged to suit our teaching to university requirements. Only certain subjects are taught at Oxford and Cambridge; and we endeavour to prepare our scholars in the subjects taught in these universities."

I thought the excuse satisfactory; but now that the old universities have introduced science teaching, and now that new colleges are being established all over the land with the same view, and bursaries are given by societies, corporations, and associations, in almost every large town, these secondary endowed schools will have no longer an excuse for not giving science instruction; they will be even under a necessity to give it for their own sakes.

Here again, however, I have to observe that the country refused to wait this slow progress of school amelioration. The Government, with the entire approval of Parliament, by means of a special department at Kensington, encouraged the establishment throughout England and Scotland of schools and classes for the teaching of science and art. This encouragement was and is now given by prizes to scholars, remuneration to teachers, and loans of apparatus to the schools. The result has been marvellous. The scheme has been in operation for only nine years. At first it was little known and not well understood; but now these schools are extending rapidly; for whilst in the year 1869, that is three years after the scheme was started, there were in Great Britain only 523 schools with 24,865 scholars, there were in 1874 (since which date I have seen no reports), 1336 schools and 53,050 scholars.

It is also proper to mention that the national elementary schools which are recognised by the Education Act for England and for Scotland, are encouraged to include various sciences in their pro-

gramme of lessons; there being capitation grants of money to the managers of these schools for scholars who, at the annual inspections, pass satisfactory examinations in various branches of science.

I have thus at some length explained what has been done during the last ten, and more particularly during the last five years, for increasing the means of scientific instruction in our universities, colleges, and even in elementary schools, because of the important bearing of these measures in promoting such objects as this Society aims at. When vast multitudes of our population become conversant with science, who knew nothing of science before, who can doubt that investigation will be stimulated, and that discoveries and inventions will be made with a speed hitherto unprecedented?

But there is another measure of even greater importance to science, which is about to be taken in this country. Our schools, colleges, and universities are institutions for teaching truths, and explaining facts already known. It is now proposed to establish colleges of research, as they have heen called, for aiding in the discovery of truths, facts, and principles not yet known.

In the year 1868, the British Association for the advancement of science appointed a committee of some of its most eminent members to report on the two following questions:—

"Does there exist in the United Kingdom of Great Britain and Ireland, sufficient provision for the vigorous prosecution of physical research?"

"If not, what farther provision is needed, and what measures should be taken to secure it"

In the following year that committee gave in a report, answering these questions thus:—

"The provision now existing in the United Kingdom is far from sufficient for the vigorous prosecution of physical research.

"Whilst greatly increased facilities for extending physical research are required, your committee do not consider it expedient to define how these facilities should be provided." The committee added, that "as the whole question of the relation of the State to Science is at present in a very unsatisfactory position, they urge that a Royal Commission alone is competent to deal with the subject."

That report having been approved of by the Association, an influential deputation waited on Her Majesty's Government, to suggest the appointment of a Commission; and accordingly in May 1870 such a Commission was appointed.

This Commission has been most diligent in its investigation and discussion of the several points remitted to it. They have examined several hundred witnesses, and have issued no less than eight reports.

Besides ascertaining the condition of our universities, colleges, and endowed first-class schools, as regards their teaching power, and suggesting in many cases that assistance should be given to them by the State, the Commissioners took up the other important question, to which the British Association specially had called attention—viz. this, whether the State ought not to aid researches for discovering new scientific facts and truths.

As the report of the Commissioners on this question is of great interest alike to men of science and to scientific bodies in this country, I quote a few sentences to show the opinion of these Royal Commissioners, and the advice they give to Her Majesty's Government:—

"The great advances in physical science which have been made in this country, and within this century, by such men as Dalton, Davy, and Faraday, *without aid from the State;* the existence of numerous learned societies; and the devotion of some few rich individuals to the current work of science, at first sight appear to reduce the limits within which State aid to research is required in this country.

"But whilst we have reason to be proud of the contributions of some great Englishmen to our knowledge of the laws of nature, it must be admitted that at the present day scientific investigation is carried on abroad to an extent, and with a completeness of organisation to which this country can offer no parallel. The work done in this country by private individuals, although of great value, is small when compared with that which is needed in the interests of science; and the efforts of the learned societies, not excepting the Royal Society, are directed merely to the discussion and publication of the scientific facts brought under their

notice. These societies do not consider it any part of their corporate functions to undertake or conduct research. . . . . .

"But whatever may be the disposition of individuals to conduct researches at their own cost, the advancement of modern science requires investigations and observations extending over areas so large, and periods so long, that the means and lives of nations are alone commensurate with them.

"Hence the progress of scientific research must in a great measure depend upon the aid of Governments. As a nation, we ought to take our share of the current scientific work of the world. Much of this work has always been voluntarily undertaken by individuals, and it is not desirable that Government should supersede such efforts; but it is bound to assume that large portion of the national duty, which individuals do not attempt to perform, or cannot satisfactorily accomplish."

The sentences which I have now read are the preamble and the basis of the conclusions to which the Commissioners unanimously came. These conclusions are as follows:—

1. "The assistance given by the State in this country for the promotion of scientific research is *inadequate;* and it does not appear that the concession or refusal of assistance takes place upon sufficiently well-defined principles."

2. "More complete means are urgently required for scientific investigations, in connection with certain Government departments. Physical as well as other laboratories and apparatus for such investigations ought to be provided."

3. "Important classes of phenomena relating to physical meteorology, and to terrestrial and astronomical physics, require observations of such a character, that they *cannot be advantageously carried on otherwise than under the direction of the Government.*"

4. "Whilst national collections of natural history are accessible to *private investigators*, it is desirable that they should be made still more useful for purposes of research than they are at present. We would now express the opinion that corresponding *aid* ought to be afforded to persons engaged in important physical and chemical investigations; and that, whenever practicable, *such persons* should be allowed *access*, under proper limitations, *to such laboratories as may be established or aided by the State.*"

5. "It has been the practice to restrict grants of money made to private investigators for purposes of research, to the expenditure actually incurred by them. We think that such grants might be considerably increased. We are also of opinion, that the restriction to which we have referred, however desirable as a general rule, should not be maintained in all cases, but that, under certain circumstances and with proper safeguards, investigators should be *remunerated* for their time and labour."

6. "The grant of L.1000 administered by the Royal Society, has contributed greatly to the promotion of research, and the amount of this grant may with advantage be considerably increased."

"In the case of researches which involve, and are of sufficient importance to deserve, exceptional expenditure, direct grants, in addition to the annual grant made to the Royal Society, should be made in aid of the investigations."

7. "The proper allocation of funds for research; the establishment and extension of laboratories and observatories; and generally, the advancement of science, and the promotion of scientific instruction as an essential part of public education, would be most effectually dealt with, by a *Ministry of Science and Education*, and we consider *the creation of such a ministry of primary importance.*"

8. "The various departments of the Government have from time to time referred scientific questions to the Council of the Royal Society for its advice. We believe that the work of a Minister of Science, even if aided by a well-organised scientific staff, and also the work of the other departments, would be materially assisted, if they were able to obtain, in all cases of exceptional importance or difficulty, the advice of a *Council* representing the scientific knowledge of the nation."

9. "This Council should represent the chief scientific bodies in the United Kingdom. With this view, its composition need not differ very greatly from that of the present Government Grant Committee of the Royal Society. It might consist of men of science selected by the Council of the Royal Society, together with representatives of other important scientific societies, and a certain number of persons nominated by the Govenment."

Such, gentlemen, are the conclusions and recommendations of these Royal Commissioners on a subject deeply interesting not only

to all scientific bodies, and men of science in this country, but to the nation at large. The Commissioners are men eminently qualified by social position, by enlightened knowledge, and by a thorough investigation of the subject, to pronounce an opinion, and I feel very confident that when their report comes before Parliament, their conclusions will be accepted, the organisation recommended by them agreed to, and the necessary supplies ungrudgingly voted.

I have, before concluding, only one other point to mention. No great measure, whether political or educational, can be adopted in this country by the Government, or even by Parliament, which has not obtained previously the general assent of the community. Now it is a gratifying circumstance, that during the last few months, many distinguished men, good judges of public opinion, and who also themselves influence public opinion, have recently taken occasion to advert to the question of scientific instruction. I have already mentioned the names of His Royal Highness Prince Leopold and his Grace the Duke of Marlborough. It so happens that the same page of the "Times" newspaper, of the 12th Nov., which reports what they said, gives speeches in the same direction by Sir Alexander Cockburn, Lord Chief-Justice of England, and by Mr Gladstone, the ex-Premier. Going back a few weeks, I find speeches by the Duke of Devonshire, the Marquis of Hartington, the Earl of Derby, the Marquis of Ripon, Lord Winmanleigh, Lord Frederick Cavendish, Sir Stafford Northcote, the Right Hon. Lyon Playfair, and Mr Bell, M.P. for Hartlepool, one of our most extensive and intelligent iron-masters.

These names I mention to show that the great landowners of the country, and also many distinguished statesmen, are responding heartily to the appeal made to them by our manufacturers and merchants, who feel that their own interests, and the continued prosperity of the country in trade and commerce, require institutions which will give to their sons, and also to the working classes, a more technical education than they have hitherto received. With such combined action, who can doubt that an immense impetus will be given both to scientific teaching and to scientific research? Wonderful indeed have been the discoveries during the last half century, even with the scanty appliances which men of science

have hitherto had at their command. These discoveries, the Lord Chief-Justice Cockburn said, "perfectly overwhelmed him with astonishment," and as the Royal Commissioners said, may justly invoke national pride, that so many of them should be due to the unaided efforts of individuals. What, then, may we look forward to in the next half century, with the additional appliances which these Commissioners recommend?

But, perhaps, here a word of caution, even from so humble an adviser as myself, may be allowed. Lord Chief-Justice Cockburn, on the occasion to which I have referred, says—"No one bows with a more profound and reverent worship at the shrine of science than I do. No one values more than I do classical attainments. Nevertheless, allow me to say, that I know of no study more valuable to an Englishman than the study of *English*. Nothing is more valuable than the power of English composition, English oratory, and English elocution; and greatly as I value classical knowledge, and the knowledge of foreign languages, I still say, that the English language and English composition are of the first importance to Englishmen." These remarks he followed up by announcing his wish to give a prize of twenty guineas annually for a piece of English composition.

Much to the same purpose, our distinguished colleague Mr Lyon Playfair, when assisting the other day to inaugurate the Science College at Leeds, expressed a hope that the institution would not be confined to science, but would embrace letters and the arts.

These views suggest one danger to be avoided by those who are anxious to establish colleges and schools for scientific teaching. The country, willing as it undoubtedly is to supply deficiencies in this respect, will certainly not agree that a knowledge of science shall be all that a well-educated Englishman or Scotchman ought to possess.

But there is another danger, and one more serious. Mr Gladstone, when distributing the prizes of the science and art classes at Greenwich, three weeks ago, made these impressive remarks:—"Whatever I may think of the pursuits of industry and science, and of the triumphs and glories of art, I do not mention any one of these things as the great specific for alleviating the sorrows of

human life, and meeting the evils which deface the world. I believe firmly in science and art, for their own purposes. I believe in their reality, their efficacy, and their value; I believe they are efficacious and valuable for the purposes for which they are ordained, but not for purposes for which they were not ordained. If I am asked what is the remedy for the deeper sorrows of the human heart—what a man should chiefly look to in his progress through life, with which to sustain him under trials nd affliction—I must point to something very different, to something which in a well-known hymn is called 'the old, old story.' It is this 'old, old story, told in a good old book, with the teaching to be found there, which is the greatest and best gift ever given to mankind, a gift carrying with it and imposing upon all alike, the most solemn trusts and responsibility, because arousing the fullest recollections of the past and the brightest hopes of the future. I venture upon this observation for myself, lest, in speaking of the immense value which is to be attached to the subjects with which we are dealing to-night, it should be supposed I was setting them up as having some exclusive right to allegiance upon your minds and hearts, or, at any rate, a right paramount to every other."

I much fear that this warning of the ex-Premier is needed. I fear it may be said, not merely of men of science, but of others also, that they often allow their hearts and minds to be so occupied —so engrossed with pursuits and studies, as to leave no room for other things which should find a place there also.

Men of science have sometimes been charged, not merely with allowing their minds to be too much engrossed in this way, but with conceit and arrogance, engendered by the consciousness of possessing wisdom above the great bulk of their countrymen. The *true* man of science, is fairly amenable to no such charge. So far from possessing that "pride, and arrogance, and froward mouth," which is condemned in the good old book referred to by Mr Gladstone, he *is*, and at all events *should be*, the reverse of all this; for whatever amount of knowledge he acquires, whatever the discoveries he achieves, no one sees so clearly the immensity of what still remains to be discovered. Even in our own planet, how little do we yet know of the composition of the earth's interior, how

little of its deep oceans, how little of the great atmosphere which surrounds us! And even if we knew and understood all and every part of our own habitation, what is that, when we think what a tiny atom that habitation is in the great system of the universe, seen and unseen!

The true man of science, knowing all this, is humble-minded, not arrogant or supercilious; diffident, not presumptuous; forbearing, not intolerant.

If these are the qualities which men of science possess and show, whilst prosecuting their studies and researches, they will secure favour for themselves and for their noble pursuits. They will be accepted and respected as the expounders of the grand and beautiful *laws* by which God governs the universe—*laws*, a knowledge and a right application of which will assuredly conduce, alike to the prosperity of nations and to the happiness of the human race.

The following statement in regard to the number of the present Fellows of the Society was laid on the table by the Secretary:—

1. Honorary Fellows—

Royal Personage—

His Royal Highness the Prince of Wales, . . 1

British Subjects—

John Couch Adams, Esq., Cambridge; Sir George Biddell Airy, Greenwich; Thomas Andrews, M.D., Belfast (Queen's College); Thomas Carlyle, Esq., London; Arthur Cayley, Esq., Cambridge; Charles Darwin, Esq., Down, Broomley, Kent; John Anthony Froude, Esq., London; James Prescott Joule, LL.D., Cliffpoint, Higher Broughton, Manchester; William Lassell, Esq., Liverpool; Rev. Dr Humphrey Lloyd, Dublin; William Hallowes Miller, LL.D., Cambridge; Richard Owen, Esq., London; Lieut.-General Edward Sabine, R.A., London; George Gabriel Stokes, Esq., Cambridge; James Joseph Sylvester, LL.D., London; William Henry Fox Talbot, Esq., Lacock Abbey, Wiltshire; Alfred Tennyson, Esq., Freshwater, Isle of Wight, . . 17

Carry forward, . 18

Brought forward, . 18

Foreign—

Claude Bernard, Paris; Adolphe Théodore Brongniart, Paris: Robert Wilhelm Bunsen, Heidelberg; Michael Eugène Chevreul, Paris; James D. Dana, LL.D., Newhaven, Connecticut; Heinrich Wilhelm Dove; Jean Baptiste Dumas, Paris; Charles Dupin, Paris; Christian Gottfried Ehrenberg, Berlin; Elias Fries, Upsala; Herman Helmholtz, Berlin; August Kekule, Bonn; Gustav Robert Kirchhoff, Heidelberg; Herman Kolbe, Leipzig; Albert Kölliker, Wurzburg; Ernst Edward Kummer, Berlin; Johann von Lamont, Munich; Richard Lepsius, Berlin; Rudolph Leuckart, Leipzig; Urbain Jean Joseph Leverrier, Paris; Joseph Lionville, Paris; Henry Milne-Edwards, Paris; Theodore Mommsen, Berlin; John Lothrop Motley, United States; Louis Pasteur, Paris; Professor Benjamin Peirce, United States Survey; Adolphe Pictet, Geneva; Henry Victor Regnault, Paris; Angelo Secchi, Rome; Karl Theodor von Siebold, Munich; Bernard Studer, Berne; Otto Torell, Lund; Rudolph Virchow, Berlin; Wilhelm Eduard Weber, Gottingen; Friedrich Wohler, Gottingen, . . 35

Total Honorary Fellows at March 1875, —— 53

The following Foreign Honorary Fellows were elected in March 1875—

Dove, Kekule, Kolbe, Kummer, Lionville, Motley.

The following are the Honorary Fellows deceased during the year—

Foreign—M. Comte de Remusat, ... 1

British—Sir Charles Lyell, Bart., Sir W. E. Logan, Sir Charles Wheatstone, ... 3

—— 4

49

2. Non-resident Fellow under the Old Laws—

Sir Richard Griffiths, ... 1

Total Honorary and Non-resident Fellows, 6th Dec. 1875, 50

3. Ordinary Fellows—

Ordinary Fellows at November 1874, ...		345
New Fellows, 1874-75.—John Aitken, Esq.; The Hon. James Bain; Dr Ludwick Bernstein; James Bryce, LL.D.; John Christie, Esq.; Robert Clark, Esq.; Dr T. S. Clouston; Dr William Craig; Daniel G. E. Eliot, Esq.; Thomas Fairley, Esq.; Robert Gray, Esq.; Sir John Hawkshaw; William Jack, Esq.; Archibald Kirkwood, LL.D.; John Ramsay L'Amy, Esq.; C. H. Millar, Esq.; John Milroy, Esq.; E. W. Prevost, Esq.; Ralph Richardson, Esq.; Michael Scott, Esq.; James Syme, Esq.; James Thomson, LL.D.; Charles Wilson Vincent, Esq.; Professor Daniel Wilson, ...	24	
B. Baden Powell, formerly elected, but not admitted till 1874; Dr Alexander Wood (re-admitted), .	2	
Total New Fellows, . .	——	26
		371
Deduct Deceased.—Rev. Dr Aitken; John Auld, Esq.; Dr J. Hughes Bennet; Rev. Dr Crawford; Col. Seton Guthrie; Sir William Jardine, Bart.; Professor Macdonald; Hon. Lord Mackenzie; E. Meldrum, Esq.; Ven. Archdeacon Sinclair, ...	10	
Resigned.—Rev. Thomas M. Lindsay; John L. Douglas Stewart, Esq., ...	2	
Cancelled.—Charles Lawson, Esq., ...	1	
	——	13
Total number of Ordinary Fellows at November 1874, .		358
Add Honorary and Non-Resident Fellows, . . .		50
Total Ordinary and Honorary Fellows at commencement of Session 1875 (6th December), ...		408

The following Communication was read:—

The Volcanic Eruptions of Iceland in 1874 and 1875. By Captain Burton. (With two Maps of Iceland).

Shortly after reading "Volcanic Eruptions in Iceland" (the "Scotsman," May 21), and "An Appeal for Iceland" (the "Times" July 1), I made a trip to Arctis, partly with a view of inspecting and inquiring into the last outbreaks. Perhaps your energetic Society may not be unwilling to have an unprejudiced account of what was seen and heard.

The accompanying maps, prepared for my forthcoming volume, ("Ultima Thule"), mark the four paroxysmal eruptions which took place upon the same area during 1867, 1869, 1870 (to 1872, at which last date all activity had subsided), and about Christmas 1874. Number five, the latest phenomenon, broke out on March 29, 1875.

These movements may or may not be connected with the five days' eruption of Skaptár Jökull (January 9, 1873), recorded by all the journals of Europe; but they certainly occupy the heart and the southern outskirts of the Odáða Hraun, the great lava field subtending the north of the Vatna Jökull, and extending to the N.N.E., almost as far as the Lake Region—Mý-vatn and its oasis. The name is variously translated "Terrible wilderness" (Henderson), and "Desert of the Evil Deed" (Baring Gould), whilst the area is differently calculated at 1160 to 1500 square miles; in fact, one half of the Vatna Jökull. Viewed from the nearest heights—Bláfjall, for instance—it is a grim and ghastly picture, a region of ruin and desolation, a fitting *mise en scène* for the Last Man: my companions remarked that such a spectacle would soon give them the horrors. I see no difficulty beyond a certain expense in crossing and exploring this waste: at the same time, I doubt that the feat would yield any results; and exploration purely for exploring appears to me like "climbing for climb."

This "great and terrible wilderness," so small and mean in comparison with the Sahrás of Africa, Asia, and South America, and yet so grisly in its brown-black desolation, is supposed by Baring Gould to be the gift of the Tröllad*ý*ngjur and of Herðubreið, while Mr W. L. Watts would derive it solely from Skjaldbreið. I find it to be the produce of a multitude of craters which opened in and south of it, before the days when Öræfi and other lofty peaks, attracting rain and snow, built up the mighty *névé*, which monopolises the south-eastern corner of Iceland. The peculiarity of the latest outbreaks (1867–1875) is the distance, not to say isolation, of the vents from any large body of water, suggesting the unpleasant fact that we must modify received opinion. For instance, the eruption of Christmas 1874 upon the south-eastern flank of the distorted horseshoe Askja (oval-shaped wooden casket) or Dyng-

jufjöll (Cubilia or "Chamber Hills"), are at least thirty-eight direct geographical miles from Mý-vatn (midge-water), and forty-five from the nearest seashore. Nos. 1, 2, and 3 vents are more distant from the lake, and but little nearer the coast. The non-maritime Andine volcanoes are popularly supposed to be connected by fissures and strata-faults with the Pacific. Here, however, the foci are separated from the Atlantic eastward by the valley of the broad and deep Jökulsá í Axarfírði, the longest, if not the largest, river in Iceland. To the west they are guarded by the Skjálfandi Fljót, and south by the huge Vatnajökull, whilst palagonite is not a rock which maintains permanent fissures like porphyry. I can only suggest that the eternal snows of the mighty *névé* take the place of lake and sea water.

Our approach to Iceland was heralded by volcanic phenomena. On Friday, July 8, as my shipmates were recovering from the sufferings which began in Pentland Firth, we found the milky blue sea patched and streaked with what many supposed to be rye—the cargo of some wrecked vessel—but which proved to be pumice, the largest piece hardly equalling a bean. On the return voyage (August 9) we passed through a similar discharge, and we heard of dense and choking ash-showers. Landing (July 10) at Húsavík, the old export harbour of the great Northern Brimstone Mines, we found burned stone thrown up in tons on the beach north-east and south-west of the factory. A few of the bits were equal to a man's fist: some were slightly vitreous, and others had a fibrous texture like asbestos; they much resembled those brought from the Askja by Mr W. L. Watts. Lastly, when we approached the focus of eruption we picked up common specimens of an intermediate size, where certainly none existed in 1872. Our maximum distance then was 70 or 80 miles, and the line of our direction was from south-west and west to north-east and east. As will presently appear, a single morning (March 19) is supposed to have discharged 3840 tons in four hours. All authorities are agreed that the ashes fell in Norway within twenty-four hours—a rapid but not an unusual rate of progress. In the Hekla eruption of 1693 the scoriæ were also carried by the winds in one day to the Fœroe Islands; the same was the case with the Skaptár outbreak of 1783; and in 1845 the goodwives of Shetland, when bleaching

their linen, were surprised to find it covered with pepper from Hekla. But instances of this nature need not be multiplied.

On July 17, while collecting specimens of brimstone from the great Mý-vatn mines, a select company of the expedition rode over the Námaskarð ("Fountain-scaur"), the gap in the *Montes Phlegræi*, east of Mý-vatn, and thence we took the highroad, or rather the bridle-path, leading eastwards over the Mý-vatnsörœfi (Desert of the Midge-water) to the greatest of the three Jökulsárs. After some three hours of sharp canter, which covered more than half-way, we sighted to the south of the road and north-east of Búrfell, a low black-blue mound with white patches. It was about a mile long; and a solitary puff, escaping every quarter of an hour, told us that it was burning low. Nothing could be meaner than this outbreak, which I will call the Mỳ-vatn eruption: it looked by the side of older formations as if Vulcan had struck work, and the underground furnace of Iceland were being "drawn." Shortly after our departure, however, Mr W. L. Watts here observed a huge Gjá, and an active eruption, which he briefly noticed in the "Times" newspaper, and which I hope he will presently describe at greater length, accompanying his description with a ground-plan and elevation.

This No. 5 is connected by a band of old lava with No. 6, a mound to the north of the road. It was first seen (Feb. 18) from the Grimstðair farm, erupting to the west of the Sveinagjá, in what is called the Austurfjöll or Mý-vatnsfjöll. The great smoky fire (jarðeld) springing from 14 or 16 mound craters (gosborg) lying on a meridian, formed, say the natives, a molten river 300 to 400 fathoms broad and one *vegarleid* (= 3 English miles) long, throwing up lava, pumice (vikur) and stones, often the size of a man, which fell down upon the crater lips. Some of the hot material melted the snow. The lava soon set, but the ground was too hot for walking, and the stone flood glowed white beneath 2 to 4 feet of the upper black stratum which had cooled in a few minutes. The plain around was split with hideous Gjár (fissures); the frequent hornitos, blisters, and hillocks on the run, probably the effects of steam, were hollow, with a capacity of 2 to 4 hogsheads, and the smoke (vapour?) hung upon the horizon like a cloud. On March 10 the eruption lasted all night, and the most violent effort

was on April 13. By that time the area of the foci (eldgígar) was about 40 square fathoms; and where the ground before was level, rose a lava hill 30 to 60 feet high. The greatest flow was to the north, and southwards a fire stream (eldgos), one mile long and 500 fathoms broad, was covered with high and rough blisters; and was overhung with whitey-blue fumes. The view was confined by the fine dust to 300 feet: during daylight it wore the semblance of a mirage (Landjóldu or Tíðbrá), and at night it became a pillar of fire.

Our disappointment was tempered by meeting a party of three Icelanders driving two ponies, whose imitation Icelandic coffers bespoke the English owner. The head guide introduced himself as Páll Pálsson; I recognised him as the godfather of "Mount Paul" in the heart of the Vatnajökull. Led by Mr W. L. Watts, he and five other islanders set out from the Núpstaðir farm on June 24, and after twelve nights and days (July 7) in the snow, the adventurous band issued from the great *névé* between Kistufell and Kverkfjöll, and on July 10—a fortnight and more—they reached Grímstaðir, whither their horses had been sent round *viâ* the Eastern path. This is, indeed, a unique feat of travel which I hope will not be its own reward. Paul, who was physically as well as morally the best type of an Icelander, accompanied us to our head-quarters at Reykjahlíð and gave me a detailed acconnt of the southern outbreaks. He saw south-east of the Kistufell and north of the Vatnajökull, but not in the snow, two small smokes, remnants of Nos. 1 and 2, distant some six hours' ride, and three others appeared in the Dýngjufjöll. This account was confirmed by Dr P. E. Julius Halldórsson, government physician of the Thíngeyjar Sýsla. Both agreed that No. 4 was still active, and they placed the site on the south-eastern bend of the Askja or southern Dýngjufjöll the curious horseshoe of the map which they would break up into detached hills, and would moreover open to the N.E. instead of the N.N.E. The lava on April 10 was about three (Danish) miles long by a maximum of half a mile broad. At night tne farm rooms were completely illuminated by the fire-blush (Eldroði), and when this ceased violent earthquakes came on. Showers of ashes fell north of Mý-vatn (Thíngeyjar Sýsla), and more copiously in the Jökulsdal (Múla Sýsla), covering the ground

with a stratum a quarter of an ell thick.* The darkness during the dust showers prevented the Jökulsdælingar (people of Jökulsdal) reading by day, and many of them left their farms and drove their cattle to grass on the Vopnafjörðr. This outbreak is supposed to have come not solely from the Dýngjufjöll, which, since April 5, emitted only heavy smoke, but from several other places in the northern, the north-eastern, and the north-western faces of the Vatnajökull. In addition to this movement, which may be called the "Dýngjufjöll eruption," and which is frequently referred to in the local and in our home papers, Dr Julius places another vent, hitherto unnumbered, about seven miles to the S.S.W. of Herðubreið, the "broad-shouldered" and perpendicular-sided mountain of palagonite, which I had attempted to ascend in 1872. I am happy to say that Mr W. L. Watts also noted the projecting buttress from the south-west, which, descried too late, appeared to me the only place for successful climbing. Here was the outbreak of May 29, 1875, and hence, according to my informant, the greater part of the ashes and pumice had been carried to the north-east. On the other hand, Mr W. L. Watts saw no crater south-west of Herðubreið, and would derive the pumice and ashes from Askja. The Medico placed a suplementary crater in the old lava-field on a meridian between Herðubreiðarfell and the Reykjahlíð-Jökulsa road. Thus we have five several vents:—A and B, north and south of the road (March 29); C, continuing the line southwards; D (May 29), near Herðubreið; and E, the Askja or southern Dýngjufjöll

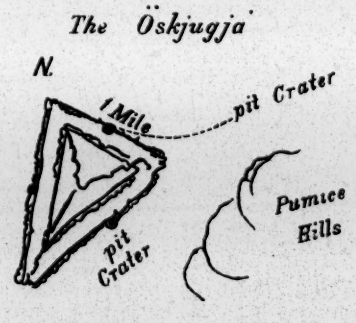
On July 29 the expedition received, at Húsavík, a visit from Mr W. L. Watts, who was fresh from the conquest of the Vatnajökull, and he gave us the first intelligent account of the movement. He had found fresh ashes, but no pumice, on the snows of the Vatnajökull, about the middle or in N. lat. 64° 25′. Kistufell was quiet; smoke or vapour issued intermittently from Kverkfjöll, which I saw in 1872 vomiting a glacier, and about Skjaldbreið rose a large mound of old lava, but no new signs of action appeared. He walked over layers of pumice, extending a score of miles, from the Svartá

* The Danish measures are:—
12 inches = 1 foot (= 12·356 English).
24 thumblungar or 2 feet = 1 alen (ell).
24,000 feet = 1 mile (= 4½ English statute miles in round numbers).

to Herðubreið, the deepest drifts measuring some eight feet, being north-east of Vaðalda to five miles south of the "Broad-shouldered."

The explorer's chief work was about the Askja or southern Dyngjufjöll—I must warn my readers not to confound these "Chamber hills" with the "Trölladyngja (sing.), perhaps better known as Skjaldbreið, the "Broad shield. As Mr Watts intends to publish his discoveries, I must not abuse the liberality with which he gave his information. He would break up the fanciful horseshoe of the great map, which in these parts is a mere field-sketch, into a heart-shaped series of hills, mounds, and cones, here connected, there separated, by "Gils" and broad passes: on the western side the Odáða lava has penetrated into the *enceinte*, and a latitudinal bar of heights traverses the southern quarter. By walking over the eastern hills Mr Watts came in sight of the centre of eruption; the aneroid stood at 25·05 (=5000 feet in round numbers, whilst the northern plain is about 1000 feet lower. Various angles to Herðubreið (80° to 40° for mag. var., west = 40), and the Skjaldbreið (170° to (04°=130°) placed the Gjá-site inside the horseshoe in N. lat. 64 45′ and about W. long. (f.) 17 .

The centre of the eruption, which we will call the Oskjugjá, was a mere fissure, an acute-angled triangle with the apex to S.S.W.; stepping the base gave a little more than a mile, and the circumference would be about five. The three arms were deep and perpendicular crevasses opened in the hills by the eruption, and the lips readily fell in. The heights around it, especially those to the east, were strewn with thick strata of pumice, ejected wet, and decomposing under atmospheric action; they also showed that surface-streams of water had lately flowed over the new matter.



The most curious part of this Gjá is that it contains a triangle within a triangle, both similar in all their accidents; moreover, there is a series of smaller fissures extending from the centre to the apex, and to the two other angles, north-western and north-eastern. At the eastern arm, a deep pit about a quarter of a mile in circumference discharges volumes of

steam and fatty fetid loam, which falls in granules. At the base is another pit-crater, opening in high and broken ground; it is also covered with pumice and offensive loam, which the depths continue to vomit. The explorer distinctly saw a pit of hot water spouted from the western side of the inner triangle: he could trace, through the volumes of steam, its shaft or column, and he heard the rain fall upon the rocks, bringing down with it an avalanche of stone. The Askja is not a Jökull, and only a few streaks of snow lay upon the flanks. This, therefore, may be considered a crucial instance of water erupted from a fire vent.

Meanwhile there are no reports of any outbreak at Herðubreið, nor in the Trölladýngur, the inadequate features from which Baring Gould would derive the Odáða Hraun. I have taken the liberty in my map of counter-marching the "Troll's Bowers," from a meridian to a diagonal, beginning south of Bláfjall and abutting almost upon Herðubreið. In local history we read dreadful accounts of Trölladýngjur's seven eruptions; of A.D. 1150 (the earliest); of 1180; of 1340, when the "Broad-shouldered" is said to have vomited for the first time; of 1359; of 1475; of 1510 (when the second outbreak of Herðubreið is reported); and, finally, of 1862, when there was an eruption of ashes, concerning which we have few and uncertain details. Thus the ratio of outbreaks from Trölladýngjur was 7 to 26 Heklas, 13 Katlas, 11 submarines, and 5 Öræfas.

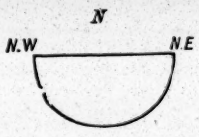
The local papers, especially the "Norðanfari" of Akreyri (February 19, March 3, April 9 and 17, and May 13 and 19; and the "Isafold," of March 27), give ample accounts of the late movements. The Mý-vatn eruptions have been visited by many parties of farmers, but only one has yet reached the Öskjugjá (Askja or Dýngjufjöll Gjá). The *relations* are chiefly from the pen of Jón Sigurðsson, of Gautland near Mý-vatn, Knight of the Dannebrog, and Althingismaður (M.P.), whom some Englishmen have lately confounded with another "White John," the celebrated agitator who lives at Copenhagen. Much of the matter has been translated and published by our home press, but there are interesting details which have not been noticed. Generally—allow me to remark—the accounts, though utterly unscientific, bear an aspect of sobriety and truthfulness wholly wanting in the older Icelandic

descriptions recorded by Mackenzie and Henderson, and they show that the spirit of enterprise has not wholly died out of Iceland. It must, however, be borne in mind that both features are mere crevasses opened by the tension of gases, and that due allowance must be made for "hills and hillocks," for "cliffs and precipices."

The "Isafold," a new paper published twice or thrice a month by Hra Björn Jönsson, and printed by Einar Thórðarson of Reykjavik, gives (No. 2, of March 27) a letter from Mý-vatn, which well describes the outbreak nearest the lake. It owes its chief interest to the fact that it is the only one which corroborates the testimony of Mr Watts, in mentioning torrents of hot water that cannot be melted snow. At 11 A.M., on February 16, an expedition ascended and crossed in half-an-hour the eastern flank of the volcano, which in that direction sends out a long spit. After mounting a low hill with a steep cliff to the south, the explorers reached a narrow crevasse lying on a parallel of latitude, and forming a "vinkil," apex, or angle to the south. Here they found a deep flat recess about half a (Danish) mile in diameter, surrounded by heights with perpendicular scaurs to the east and south; west and north-west the land was lower and flatter. Snow covered the whole country. Hard by to the south-east and on plain ground rose the crater which vomited the densest smoke, but there was no new lava except upon the lips. The stone-rain, and hot ground burning their shoes, prevented them approaching it nearer than 70 fathoms, but they computed the diameter at 40 to 50 fathoms, and the cone sides were so steep that the breadth above and below was about the same. The crater jetted in paroxysms. The thick smoke made the ejected matter appear like torn fragments of coat lining—evidently melted stone or burnt mud, most of which fell back into, or on the edges of the bowl. The smaller rapilli were thrown to a minimum height of 100 fathoms. No fire appeared in the crater. Some 80 to 90 fathoms to the west was a cliff probably formed by the eruption; it measured a tenfold area (8000 to 9000 square fathoms). The rocky edge, except to the north-west where it was lowest, stood some 6 fathoms high. Below and south of the cliff rose a second and a somewhat smaller crater. It jetted steadily, but not so high as the other: discharging a lava-rain

to the south-west; *and a rivulet of almost transparent water flowed to the north-west, where it formed a little basin under the rocks.*

The expedition did not attempt the cliff because they had no ropes, and both rocks and snow were cracked and crevassed. A little further west rose the third crater, which vomited only smoke. Its "Vinkil" or apex was a horseshoe, with the two heels to the north and the toe facing south. It is perhaps a little higher than the level of the Mý-vatnssveit (the adjoining midge-lake country). If much more lava flow, it must be filled up, and then the fiery torrent will run over and along the cliff to the sandy waste on the left bank of the Jökulsá. East of the new mountain and the recess was an old Hraun or lava stream, which seemed to have discharged eastwards; the bed showed no signs of craters nor volcanic vents, but the snow will prevent till next summer any examination of the Steintegundir (minerals).



Ash showers have been blown to the north-east of the Austurfjöll and, falling on the grass, which was bare of snow, they will probably injure the pastures. It is reported that stone-rain extended to Kelduhver east of the Reykjarheiði. About New Year's day, an earthquake opened great crevasses where formerly the ground was smooth. These movements were numerous near the volcano. The expedition built a snow-house under the ravine-cliff, but the falling stones compelled them to abandon it.

The "Norðanfari" of February 19, relates that during the winter of 1874–5, a strong earthquake, proceeding from the southern or outer Dýngjufjöll (hin fremri), shook the farms of Viðidal, Grímstaðir, and Möðrudal á Fjöllum, in the latter levelling some buildings. From No. 13 of March 3, we learn that four men of Mý-vatn (Mý-vatningar) set out on Feb. 15, directly southwards, and after walking 24 hours, hearing frightful subterranean thunders (dunur) like cataracts from a mountain, and smelling sulphur fumes (eldlykt), they reached the Askja, which has been incorrectly laid down on the map. The jets of stone and lava, thrown many feet high, prevented them approaching nearer than 60 to 70 fathoms. The vents consisted of one large focus and of many small parasites, a single one discharging lava. In early February smoke appeared every day, and presently

came a slight earthquake. In April 9th, Jakob Hálfdánarson, the farmer of Grímstaðir on the Mý-vatn, reports his visit to the Mý-vatnsfjöll, where, on March 10th, the eruption lasted all night; and next day the smoke, hanging for a full eiktarlengd (three hours) upon the horizon, was dispersed by a storm. He walked northwards over the lava hill (Hraunmalarkamb), and saw the molten stone in the crevasses as if a fire had been built with wood and charcoal. East of the Kamb (coombe), he inspected two big crevasses erupting large stones, which fell back into them. The lava had flowed for two days, and small fragments lay 300 fathoms distant from the fire stream: 160 fathoms to the west smaller bits were found; but the greatest quantity was heaped up within ten fathoms of the vent (eldsupptök). An anonymous account of the same eruption, supposed to be by old Pètër Jónsson of Reykjahlíð, father-in-law to Jakob Hálfdánarson, is given in the "Norðanfari" of April 17, 1875. He reports that sundry Laxárdalers rode some six hours from Reykjahlíð to explore the new volcano, *við* Hvann-fell, where they heard loud thunderings. A storm raging at the time in the north-west made them mistake the cause: those rumblings became fiercer as they approached the focus. The earth-fire springing out of three places in a meridianal line, formed high lava hills upon the level ground. The greatest altitudes were to the north: 50 to 80 fathoms west of the northernmost, upon a tract which had sunk more than three mannahæðir (stature of man), lay a great "gil" or crevasse. About the three foci, which owned from 20 to 30 parasites, the lava had run mostly to the south-east, but now he saw it flowing from the southernmost to the S.S.W. The northern was an elongated rise, and from its crater, about 300 fathoms in length, hot lava jetted 200 to 300 feet aloft, and fell in small cold drops upon a scanty area No fire appeared during the day, only white mist (gufa), growing whiter as it rose in the air; it was so thick that it towered many fathoms high, and the direction was perpendicular, although a strong wind was blowing. In the darkness of the night conflagrations became visible. No ashes fell at Mý-vatn, though they were thickly spread by a strong north wind, and were strewed together with pumice over the eastern regions, especially at Jökulsdal, Fljótsdal, and Seyðisfjörð. In the first-mentioned place candles were lit for

five, in the second for three, and in the third for four hours. The layer of pumice and ashes measured some 4½ inches deep in the Jökulsdal, and 1½ in the Seyðisfjörð. This was the sixth explosion since the outbreak, and about every tenth or twelfth day the violence increased. The line extended through the Odáðahraun to a little north of Reykjahlið-Grímstaðir road.

About Easter-day a thick smoke was seen at Möðrudal á Fjöllum; it rose south of Herðubreið, and many erroneously thought that it came from Möðruðalsland. Others supposed it to rise from the Dýngjufjöll, but it was certainly from Vatnajökull, or from the Tungu (Doab or Mesopotamia), formed by the westermost forks of the Jökulsá. The discharge of pumice (*Danicé* "Pimpsteen") was so abundant that for days the ferry boats could not cross the stream.

The "Norðanfari" of May 13 contains an unsigned article, bringing up the account of our Mý-vatn eruption to May 5. Loud thunderings with thick smoke were noticed on the last "Tuesday in the winter," that is, on April 13; the summer beginning with "Sumarmál," April 17. On the "first summer day" (April 22) four men took horse to visit the volcano. From Kollóttafjall they saw a fiery crevasse, made like a mountain "fjargyá," or sheep fissure where the animals take refuge during bad weather; and on the borders of the Sveinagjá, where a fine grassy plain formerly extended, they found a high hill of lava pierced with three craters lying on a meridian. These vents roared loudly, and threw up rocks, which returned to the earth after 45 seconds. The smaller rapilli rising like smoke disappeared in the air, and presently fell like snow. From the largest focus, which lay south of the road, a fiery flood ran westward: it had been reported three (Danish) miles long, but it proved to be about 1000 fathoms, with a breadth of 300 to 400. The people of Mý-vatnssveit have lost a little grass, chiefly to the north of the road, and their ponies may suffer during the winter. Some convulsion has taken place in the Dýngjufjöll, whence, for a long time, more smoke issued than during the winter. There was a great eruption close to the Odáðahraun on March 18 and 19, and the concussion of the air drove the farm peeple from their beds. On March 23 fire was reported to have proceeded from forty places lying close to the Hólsfjöll road, but it lay west, not east, of the Jökulsá.

Extracts from the letter of my friend, Sira Sigurður Gunnarsson, the priest of Hallormstað, addressed to the "Norðanfari" of April 24, appeared in the "Times" of July 1, 1875. It is dated March 29, 1875, and headed "Fall of Pumice and Ashes in Múlasýla." The author, I may remark, has more than once visited the Vatnajökull. The following interesting details may be added to the abstract:—"During the Yule of 1873, and in early 1874, an earthquake shook the eastern regions, after which the people of the Fjöll country saw two tall pillars of thick smoke apparently proceeding from the Askja or Dýngjufjöll; and viewed from Hallormstaðarháls they rose at a considerable distance from each other. Early in the year there was no fire in the Mý-vatnsörœfi, and the earthquake became less violent towards the end of the winter."

After noticing the thunderings and the ash and pumice rain of March 29 (Easter Monday) reported in the "Times," my reverend friend continues:—"The movement appears to have taken place in the southern part of the Dýngjufjöll, westward of Herðubreið, and a short way north of the winter Gjá. The direction of the ashes was on both sides of a line to Mödrudal and Fossvellir, as far as the Unáos in Hjaltarstaðarthingá and the Vatnsdalsfjall. Another shower, travelling from west to east, and extending four (Danish) miles, fell at Brú, and a mile and a half east of Aðalbol (Rafnkelsdal), Kleif (Fljótsdal), Skriðdal, and as far as Fáskruðsfjörð to the south-east. The amount which fell east of that line in Breiðdal and Stöðvarfjörð was trifling. If we draw one straight line from the focus of the eruption eastward between Fáskrúðs and Stöðvarfjörð, and a second from Vatnsdalsfjall near Njarðvik, also to the east, the area upon which the ashes and pumice rained would hardly be less than 100 square miles. Also assuming the average depth of the layer at 3 inches, we must assign to the discharge of March 19 a weight of 3840 tons."

"It is reported that the ash showers have ruined twenty farms in the Jökulsdal (between the Lagarfljót and the eastern Jökulsá) and in the northern Múla Sýsla, where the owners are preparing to abandon their property. The position of the Fljótsdalshèrad, where the scoriaceous rains fell thickest, are the Jökulsdal, Fell, Fljóstdal, Skogar, Skriðdal, Vellir, and Eyðathinghá. Heavy and terrible showers also desolated Norðfjörð, Reyðarfjörð, Mývafjörð, and

Loðmundarfjörð. Where the land has abundance of water, as in parts of Skriðdal, Vellir, and Eyðathinghá, the farmers hope that the ashes will disappear during the spring, and that they will be dissolved by the rains." This interesting letter concludes with an exhortation "not to abandon the holdings for good," and with excellent advice about the measures to be taken. Yet it owns that "from this fearful visitation all husbandry in the east country must come to utter ruin," and the less Icelanders are advised not to emigrate the better for the island.

The writer of "An Appeal for Iceland" ("Times," July 1, 1875), compares this mild and harmless eruption, which has not destroyed a single life, with the terrible convulsions of 1783, which killed some 14,000 human beings. He also calculates the destruction of pastures to the extent of 2500 to 3000 square miles, while popular computations make 4000 square miles the habitable area of Iceland.

According to Páll Pálsson only four farms on the west of the Jökulsá have suffered severely. These are, going from south to north, Brú, Eyrikstaðir, Hákonarstaðir, and Arnórstaðir. Herra Thórður Gudjónsson, factor at Húsavík, never even heard of the eruption till I showed him the nepawspers. Finally, the brown shadings in my chart, marking the eastern and north-eastern limits of the ash showers, and copied from an Iceland map obligingly lent to me by my friend, Mr Robert Mackay Smith, may be allowed to prove that the damage extends over a small area.

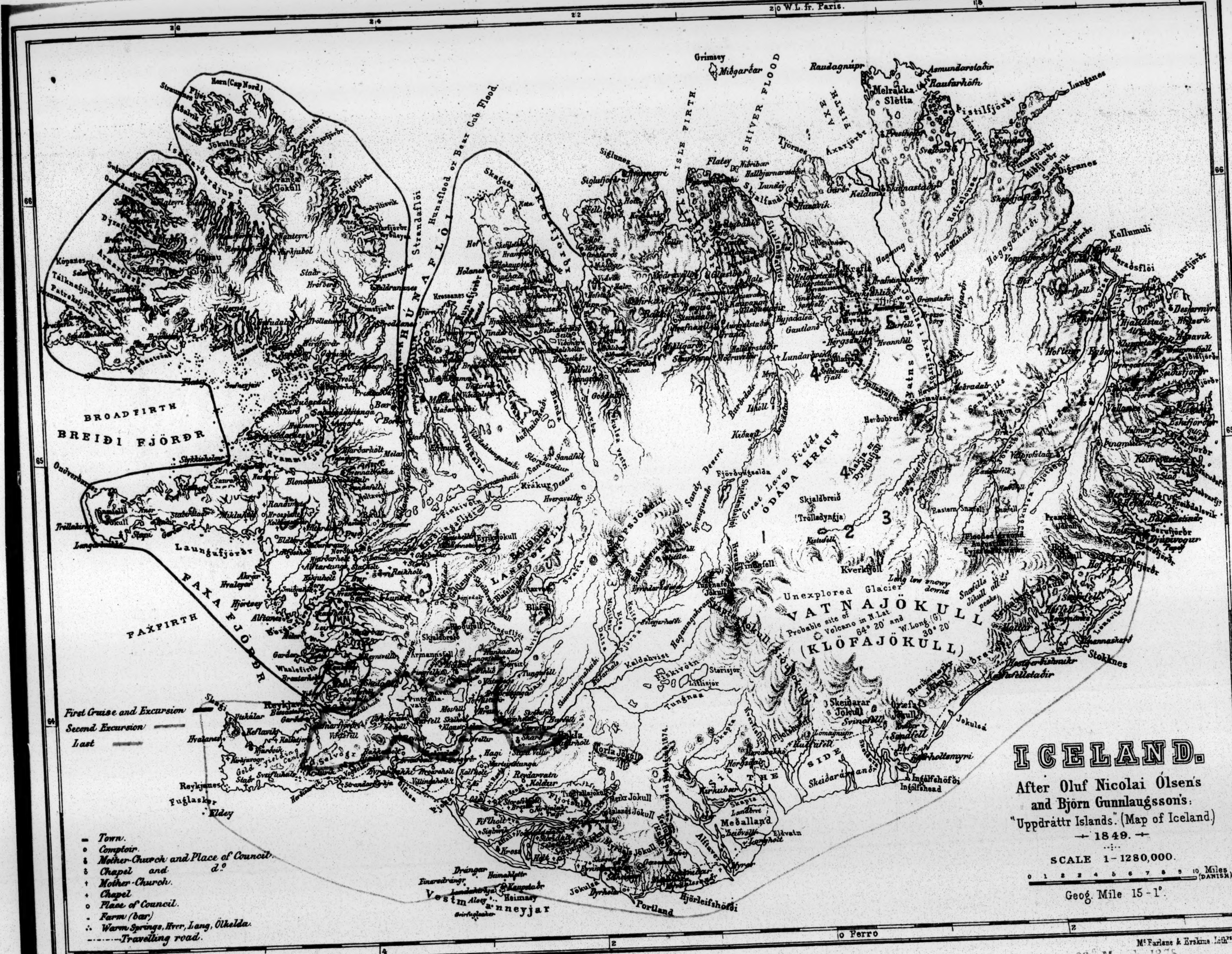
Mr Jón A. Hjaltalín, of the Advocate's Library, Edinburgh, received (June 26) trustworthy accounts of the ash and pumice rain. "It extended over several parts of Norður Múlasýsla and Suður Múlasýsla, depositing a layer about 1½ inches thick. In some places the winds have carried it off, but sundry parishes will be unable to keep their live stock at home this summer. Next hot season, however, it is expected that the pastures will be all right."

Mr W. L. Watt, who has just ridden over the ground, found the pumice and ashes beginning about the middle course of the Svartá (N. lat. 64° 50′), and extending northwards to Herðubreið (65° 10′), or a total depth of 20 to 25 miles, bounded eastward by the Jökulsá, where the country is not, and never has been, habited by man.

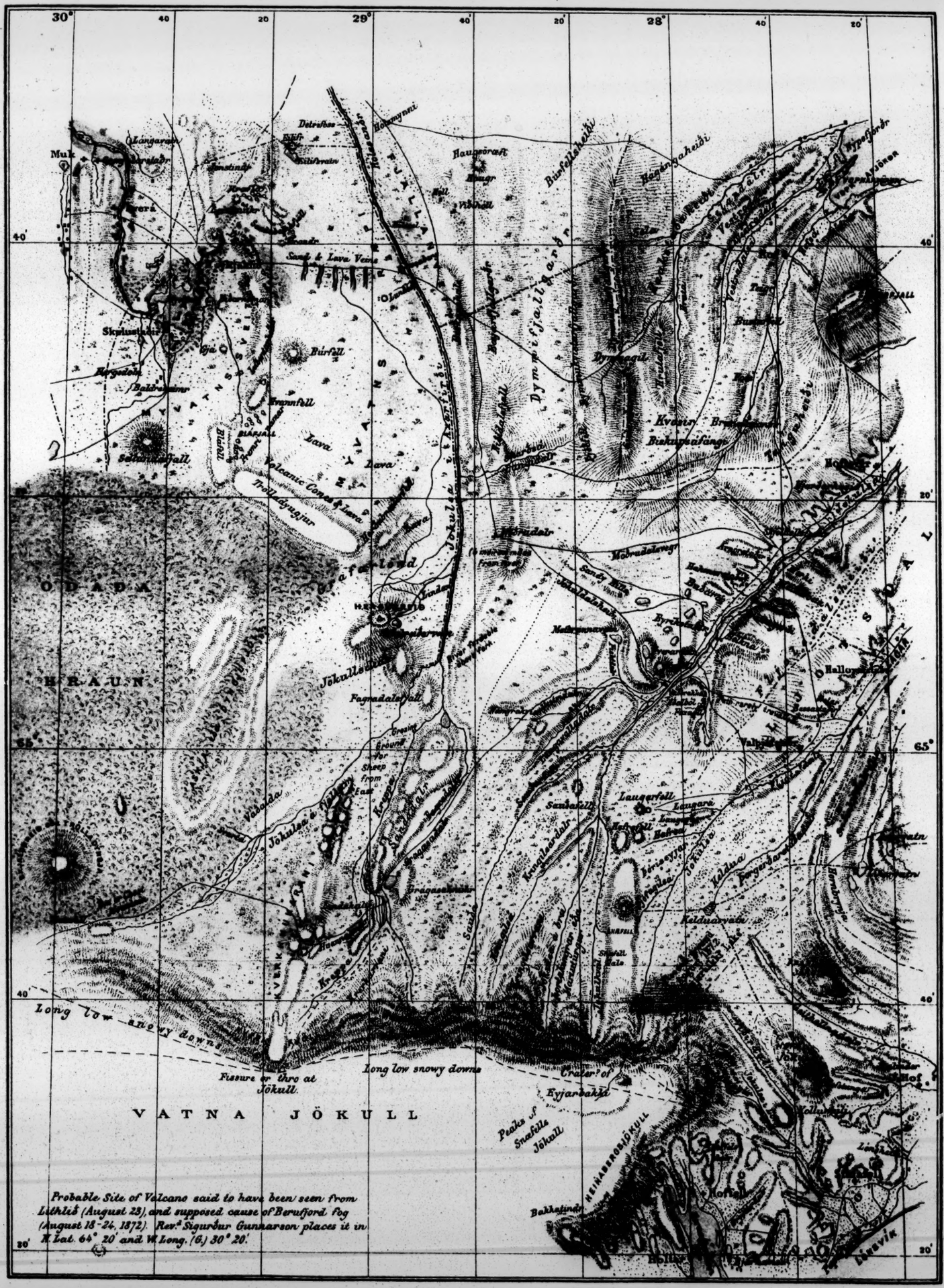
The limits of this paper do not permit me to enter into all the details of the last eruption in Iceland; but the reader may be assured that the outline and the main features of the subject are correctly drawn.

The following Gentlemen were elected Fellows of the Society:—

Bruce Allan Bremner, M.D.
Rev. Francis Edward Belcombe.



Nº 1, 2, 3. Eruptions with intermissions during the years 1867, 1869, 1870-72. Nº 4, Eruption about Christmas 1874. Nº 5. Eruption 29th March 1875.
The brown shading mark the Ashes thrown S. E. to East.



M.c Farlane & Erskine, Lith.rs Edin.r

William P. Nimmo, London & Edinburgh.